

The Scientific Movement In Education

THIRTY-SEVENTH YEARBOOK, PART II

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for the Study of
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The Thirty-Seventh
Yearbook

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THE THIRTY-SEVENTH YEARBOOK

OF THE
NATIONAL SOCIETY FOR THE STUDY
OF EDUCATION

PART II THE SCIENTIFIC MOVEMENT IN EDUCATION

*Prepared by the Society's Committee on
Education as a Science*

FRANK N. FREEMAN (Chairman), LEO J. BRUECKNER, ERNEST HORN,
M. R. TRABUE, RALPH W. TYLER, WILLIS L. UHL, and
GUY M. WHIPPLE

Assisted by Members of the Society and Others

Edited by
GUY MONTROSE WHIPPLE

THIS YEARBOOK WILL BE DISCUSSED AT THE ATLANTIC CITY MEETING OF THE
NATIONAL SOCIETY, SATURDAY, FEBRUARY 26, 1938, 8:00 P. M.

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EDITOR'S PREFACE

It was at the Minneapolis meeting of the Board, in February, 1933, that Dr. Harold Rugg, present by invitation, outlined a yearbook proposed by him to be published under some such name as "The Science of Education." His idea was that this volume would take the form of a summary and appraisal of the main outcomes of the work in education during the past three decades and that it should be produced by a group of active members of the Society who had themselves been workers in the field during that period. At a second session of the Board two days later a special and more extended report upon this proposal was presented by Drs. Rugg and Freeman, the report was adopted, and the yearbook placed upon the Society's schedule with the anticipation that it would appear in 1935. Subsequently, at the June, 1933, Chicago meeting of the Board, it was voted to defer publication until 1937 on account of previous commitments to other yearbook committees.

Dr. Rugg held one meeting of his Committee in 1933, but no meeting in 1934; in December, 1935, shortly after the Board had voted to lay on the table the question of the continuance of this project because of no activity upon it for nearly two years, Dr. Rugg proposed, on account of the pressure of other interests, to resign his chairmanship of the Committee. His resignation was accepted and Dr. F. N. Freeman was appointed to succeed him, with full power to reconstitute the yearbook committee. (The original somewhat unwieldy and expensive committee of more than a dozen persons was to this end abolished.)

At the Chicago meeting of the Board in July, 1936, Dr. Freeman submitted a new outline and proposed that, in view of the real importance of the topic and of the desirability of making a sort of inventory (a straightforward, objective description and appraisal of what the scientific movement in education had accomplished and what it had not accomplished), the Board of Directors, which had already discussed the undertaking at length, might to advantage constitute itself a yearbook committee and attempt to get the proposed volume published as one part of the 1938 yearbook.

The results of this attempt are spread out for our members in the pages that follow. Each member of the Board has contributed one or more chapters—a chapter was being prepared, too, by the late Dean Haggerty whose untimely death prevented the participation he was

eager to make,—and the Committee has likewise drawn heavily upon the goodwill and professional competence of numerous members of the Society as well as upon the assistance of a few persons invited from without our membership.

The Directors hope that their efforts will find approval.

G. M. W.

INTRODUCTION

THE PURPOSE AND SCOPE OF THE YEARBOOK

FRANK N. FREEMAN

Chairman of the Committee

Professor of Educational Psychology

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It is now thirty-five or forty years since the beginning of what is commonly called the scientific movement in education. It is not worth while to try to establish any specific date for the beginning of this movement. It includes studies in various fields and these studies began at somewhat different times. For example, the study of mental and physical development of children began with a number of biographical studies of infants and expanded later into the investigations of children and youth made by such men as G. Stanley Hall and Earl Barnes and their associates and students. These investigations flourished in the nineties. Again the development of mental tests originated about 1890 but did not assume practical form until Alfred Binet had prepared his mental-age scale in 1908; while the beginning of the measurement of the attainment of pupils in relation to their instruction is commonly ascribed to J. M. Rice,¹ whose famous study on spelling appeared in 1897. The group of educators who made up the Herbart Society in the nineties began by basing their educational practices on the psychology of Herbart. While this psychology was not established by objective investigation, it was more nearly scientific than the highly speculative views that commonly supported educational practices. Early psychological studies are represented by Bryan and Harter's² study of learning in the mid-nineties, Thorndike's³ experiments in animal learning and in transfer at about the same time, and Judd's⁴ investigations in the

¹ J. M. Rice. "The futility of the spelling grind." *Forum*, 23: 1897, 163-172.

² William Lowe Bryan and Noble Harter. "Studies in the physiology and psychology of the telegraphic language." *Psychological Review*, 4: 1897, 27-53.

³ Edward L. Thorndike. "Animal Intelligence." *Psychological Review Monograph Supplement*, 2: 1898.

⁴ Charles H. Judd. *Genetic Psychology for Teachers*. (D. Appleton and Company: New York, 1903. 329 pp.)

psychology of the elementary-school subjects at the turn of the century. The objective attack on administrative problems followed soon after. It is exemplified by Elliott's⁵ analysis of school finance in the cities of the United States and by Ayres'⁶ study of the retardation of pupils in the school and Thorndike's⁷ study of elimination of pupils from the school. While, therefore, it would be futile to set any particular event or date as a beginning of the scientific movement, it is clear that the turn of the century marked a new era.

The inquiry to which the term 'scientific' is applied may be conceived broadly or narrowly. There is a good deal of controversy concerning the question whether there is a science of education and concerning what types of inquiry should be called scientific. The members of the Yearbook Committee do not enter into this controversy. They have, therefore, chosen a broader title than 'the science of education' and interpret the aim of the Yearbook to correspond. They have conceived the purpose of the Yearbook to be primarily to give a broad descriptive account of the methods and results of a systematic study of education. Some of the methods are more exact than others and some of the fields of education have been more adequately investigated than others. Much of the study would not be deemed 'scientific' in the strict sense of the word. It does constitute, however, an effort to secure as exact information as possible to serve as the basis for practice. It is this effort that constitutes the common feature of all the studies here reviewed.

It would obviously be impossible to make a detailed review of the studies that have been made in the past generation in all the fields of education. Such detailed summaries are being made in the *Review of Educational Research*. Even that journal, which devotes three volumes to the review of education every three years, is overcrowded with details. In one volume like this, covering the work of a generation, it is obvious that only the broad outlines can be sketched.

The emphasis in this broad review of the study of education is upon the contributions that have been made to educational practice. In

⁵ Edward C. Elliott. *Fiscal Aspects of Public Education*. (Columbia University Press: New York, 1905. 101 pp.)

⁶ Leonard P. Ayres. *Laggards in Our Schools*. (Russell Sage Foundation: New York, 1909. 236 pp.)

⁷ Edward L. Thorndike. *The Elimination of Pupils from School*. (U.S. Department of the Interior, Bureau of Education, Bulletin, 1907, No. 4: Washington, D. C., 1908, 63 pp.)

making such a review it is, of course, necessary to cite the more important facts that have been revealed by investigation. The broad significance of the generation of study can be fully comprehended, however, only by a review of the effects that this study has had upon educational practice as well as upon the findings of the studies themselves. Accordingly, the Committee has placed first emphasis upon the educational procedures themselves, upon the changes in these procedures that have taken place in the past generation, and upon the influence that the study of education may fairly be said to have had upon these changes.

In accordance with this emphasis, Section I of the Yearbook has been devoted to the contributions that have been made by the study of education to the various fields: administration, training of teachers, curriculum, methods, and so on. The author of each of the several chapters of this section has assumed the task, first, of tracing the developments in this field and, second, of showing the relation between these developments and the studies that have been made in them. Each chapter is more than a mere history of the changes that have taken place or a summary of the studies that have been made. It is rather a combination of these two in the attempt to show the relation between them.

These reviews are made relatively brief in order that attention may be centered upon the more important issues. Each of the chapters might easily be expanded into a monograph or a book. Such expansion would, however, defeat the purpose of this Yearbook, which is to give a bird's-eye view of the whole development of education during the past generation. A detailed account of the development in the special fields would be useful to the specialist. The more comprehensive account here given is designed for the teacher or administrator who wishes to get a general view of development throughout the whole field of education.

In order to understand the development of the exact study of education it is necessary to give an account of the methods as well as the results of this study. These methods are not coördinate with the various fields of education. Several methods may be used in attacking the problems of a given field, and the same method is used in studying various fields. Section II has, therefore, been devoted to a review of the chief methods and techniques of inquiry in education.

As in the case of the review of the contributions of research, this account of methods must also be brief. Its aim is not to give instruction

in the use of these methods, but rather to give a comprehension of their general character and significance and of the ways in which they have been applied. In each case a brief historical account is given to show how these methods have become elaborated and adapted to their purpose. The types of problems for which they are suited are also reviewed. Some account of their possibilities and limitations is given, and suggestions are made concerning their future development and their further application to educational problems.

Our reference to the Herbart Society indicates one way in which scientific information may be brought to bear on educational problems apart from a specific attack upon them. A knowledge of the general facts and principles related to a given field of activity will suggest modes of procedure appropriate to these facts or principles. The concept of evolution, for example, gives one a different point of view toward many educational problems than would grow out of the conception of the world after a more static pattern. Such broad general concepts inevitably affect our approach to particular problems.

Again, the knowledge of the basic sciences has an important influence upon our thinking and practice in education. Our conception of the nature of learning, of mental growth, and of individual differences cannot fail to be carried over into the methods and organization of the school. We have not recognized so clearly the bearings of social organization, economic science, and political science upon education, but have recently become more sensitive to the relationships of these disciplines to our problems. It is pertinent, therefore, to review the general scientific concepts and the facts and principles of the particular sciences with reference to their bearing on general points of view and practices in education. This is done in Section III.

It seems appropriate at the conclusion of this review of the contributions of the study of education and of the methods, facts, and principles of such study, to treat the question of the theoretical bearing of such study on education. The familiar controversy concerning the scope and limitations of science as a basis for determining educational practice at once comes to mind. A mere continuation of the controversy in its usual form would, perhaps, be sterile. The controversy has too frequently descended to a mere quibbling over terms. What would seem to be important is rather, first, a general estimate of the contributions that have been made by factual investigation and, second, a more fundamental inquiry into the sources of knowledge, theory, and prac-

tice. If we pursue this inquiry to its end, we shall have to deal with the basic question of the relation between thought and experience. There has recently become evident a renewed cleavage in the opinion concerning the priority of thought or experience. It seems pertinent, therefore, to have the issues on this question clearly brought out, since the full significance of the empirical study of education will be determined by one's answer to this fundamental question. This is the general theme of Section IV.

The current discussion of this question has narrowed down chiefly to a debate between the proponents of an absolutist type of philosophy and the pragmatic philosophy. The absolutist philosophy gives priority to metaphysics and regards research as a means of working out applications, merely. The pragmatic philosophy recognizes experience as the source of truth and of value and science as an important means of formulating experience. Some Pragmatists reserve to philosophy as distinguished from science, however, the determination of values. The positions of the absolutist and the pragmatic philosophies are contrasted by Professor Dewey in Chapter XXXVIII.

In the final chapter an attempt is made to explore the possibility that science may deal with the question of values. It is granted on all sides that science is competent to deal with immediate and instrumental problems. The question is tentatively raised in this chapter whether the distinction between immediate and ultimate problems needs to be made or whether the objective methods of science may not in time be applied to even the ultimate questions of value.

SECTION I

THE CONTRIBUTIONS OF RESEARCH TO THE
ADVANCEMENT OF EDUCATION

CHAPTER I

CONTRIBUTIONS OF SCHOOL SURVEYS

CHARLES H. JUDD
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University of Chicago
Chicago, Illinois

I. PRECURSORS OF THE SCHOOL SURVEY

Long before the term 'school surveys' came into use there had been more or less systematic studies of school systems. One hundred years ago Horace Mann and Henry Barnard were inspecting the schools of the New England states and were writing critical evaluations of what they found. They were visiting Europe with a view to finding better forms of organization and better methods of teaching than were common in their day in American schools. Before these pioneers in educational reform on this side of the Atlantic inspected schools and studied their virtues and defects, Victor Cousin, a representative of the French educational system, had visited the Prussian schools and had rendered a report that was translated into English in 1832 and was widely read in America as well as in England. Calvin Stowe, following the example of Cousin, visited Prussia for the purpose of studying the school system. He went at the request of the legislature of the State of Ohio and reported to that body. His recommendations were the basis of far-reaching reforms in the educational systems of Ohio and the other states west of the Allegheny Mountains.

II. POPULAR INTEREST STIMULATED BY PERIODICALS OF THE NINETIES

In the last decade of the nineteenth century, popular interest in schools and colleges was greatly stimulated by the writings and addresses of numerous educational reformers: G. Stanley Hall, John Dewey, Charles W. Eliot, William Rainey Harper, Francis Parker, William T. Harris, and others. The magazines of the 90's described the leading municipal school systems of the United States, thus reflect-

ing the popular interest in the reforms that were being inaugurated by the leaders in these systems. The editor of the *Forum*, J. M. Rice, was especially active during the decade of the 90's in preparing educational articles describing the leading school systems. In 1897 he published what may be thought of as the first general survey of a particular educational field. His article dealt with spelling and reported the results of tests that he administered in a number of school systems. Rice did not use the word 'survey' in his article on spelling, but his method of quantitative comparison of results of teaching and his analysis of the significance of his findings were of the type that later came to be recognized as characteristic of school surveys.

III. STUDY OF THE CHICAGO SCHOOLS IN 1897

In the same year (1897) that Rice's article appeared, a publication appeared in Chicago under the title, *Report of the Educational Commission of the City of Chicago*. This report reflected the educational views of President Harper, who was the most influential member of the Commission. It was a thorough study of the educational system of Chicago and contained numerous recommendations for changes that the Commission deemed to be desirable.

IV. INTERRELATION OF THE SURVEY AND THE MEASUREMENT MOVEMENT

The early years of the twentieth century witnessed the rapid development of techniques for measuring intelligence and achievement of pupils. E. L. Thorndike published his volume on *Mental and Social Measurement* in 1903; the Binet-Simon Scale was perfected in 1908 and imported into this country by Goddard and Terman. The general movement described by the phrase, 'the measurement movement in education,' gained momentum and had fully established itself by 1915.

V. SOCIAL AND ALLIED SURVEYS

The schools were not the only institutions of organized society that were subjected during the first decade of this century to searching scientific inquiry. Municipal organization, housing, recreation, and other aspects of community life were studied by political scientists and sociologists by methods that yielded exact quantitative facts and permitted comparisons and evaluations on a large scale.

In 1907 the city of Pittsburgh was made the subject of an intensive study and the term 'social survey' was used in describing the character and purposes of the inquiry. This term was borrowed from the land surveys made by civil engineers and so aptly described the procedure of the students of social life that it was shortly adopted very generally for all kinds of studies dealing with society and its institutions.

VI. THE ENTRANCE OF THE IMPORTED EXPERT ABOUT 1910

The year 1910 and the years immediately following may be thought of as the years during which the school survey movement had its real beginning. Up to that time studies of school systems were made either by public officials in the performance of their routine duties or by investigators interested in some particular phase of education. In 1910 and 1911 a new element entered into the situation. This new element can be described by saying that certain school systems imported experts from outside the system for the purpose of securing advice regarded as superior to that which could be secured from public officials or casual observers.

In 1910 Charles S. Meek, the superintendent of schools of the city of Boise, Idaho, invited Calvin N. Kendall, the superintendent of schools in Indianapolis, to spend a week inspecting the schools of Boise. Kendall rendered a report that was published in the *Idaho Statesman*, the local newspaper. It dealt with such matters as school buildings, teachers, the course of study, the organization of the system, and the attitude of the community. In 1911 Professor Paul Hanus, of Harvard University, inspected schools in Montclair, New Jersey, and Professor E. C. Moore, of Yale University, inspected the schools of East Orange, New Jersey. Both inspections resulted in published reports dealing with the problems of the schools.

It is interesting to note that in Part II of the *Thirteenth Yearbook* of this Society, published in 1914, one of the questions most fully discussed was whether outsiders should be brought into a school system to pass judgment on the success of the system. There are in that yearbook several strong statements contending that a survey should be made by members of the official staff of a system, not by experts imported from outside.

The conduct of surveys by individuals from outside the system to be surveyed became the fashion, in spite of the opinion held by writers quoted in the Yearbook of 1914. The reason why outsiders were fa-

vored was that the regular members of the school staff were usually too fully occupied in routine administration to make the survey. Furthermore, in some cases either the board of education or some group of citizens believed that the affairs of their schools were not being well conducted and desired an impartial judgment. A number of the surveys made in the years between 1911 and 1920 did, indeed, result in a reorganization of the personnel of the staff of the system surveyed. Superintendents were literally afraid of surveys during the period mentioned and were for this reason opposed to the rapidly developing measurement movement in the educational world.

Another cause contributing to the frequent opposition to surveys on the part of school officers was that every survey resulted in a large number of recommendations, each of which called for some change in the operations of the system surveyed. It is, of course, quite impossible to study any school situation without discovering a number of points at which improvement is possible. In the ordinary course of administration, improvements are introduced gradually, one by one. If a hundred demands for change are made at one time, the school system is likely to be seriously disturbed and public confidence is likely to be shaken.

VII. THE BALTIMORE SURVEY: A TYPICAL STUDY OF A CONTROVERSIAL SITUATION

Some of the earliest surveys were carried on in situations that were distinctly controversial. For example, the school system of Baltimore, Maryland, was surveyed in 1911 for the purpose of setting at rest in one way or another the disturbance that had arisen as a result of the resolute efforts of a highly competent superintendent to raise standards. The Board of Education of Baltimore appealed to the United States Commissioner of Education to make a study of the situation and to render a report. Commissioner Elmer E. Brown accordingly set up a commission, associating with himself Professor E. P. Cubberley and Superintendent C. N. Kendall. The commission secured a staff and made a thorough study. Since this is the first school survey employing a staff, it may be well to indicate somewhat fully its scope.

The text of the report contains 102 pages. A summary of 8 pages precedes the detailed tables and reports and presents the findings of the Commission. The body of the report consists of five chapters. Chap. I (6 pages) describes the plan and history of the survey itself. Chap. II (26 pages) gives a history of the Baltimore school system and an outline of the social and legal

relations of the system. Chap. III (44 pages) deals with the following topics: (a) The System of Supervision; (b) The Teaching Force and Its Training; (c) The Elementary Curriculum. Chap. IV (10 pages) deals with the physical conditions in the schools. Chap. V (9 pages) deals with various general topics.

The text includes numerous tables and charts. In many of these charts the Baltimore schools are compared with schools in the other leading cities of the United States.

This report contains much matter dealing directly with the problems of administration and supervision and with the criticisms of the administration. It is evident from the whole tone of the report that the Commission was expected to pass judgment, either favorable or unfavorable, on the administration.

From the description given in the preceding paragraphs it is apparent that the possibility of making a survey and rendering objective judgments about a school system depends on the ability of the surveyors to secure factual data and to present these data in quantitative form. The survey movement was an outcome of the measurement movement. Surveys made prior to the development of measurement techniques were expressions of personal judgments and carried weight only to the degree that the person rendering judgment commanded confidence. The surveys of 1910 and subsequent years were objective scientific studies.

VIII. THE NEW YORK CITY SURVEY: A CONSPICUOUS AND COMPLEX REPORT

It is not possible in a brief statement such as the present to include detailed accounts of the surveys that followed in rapid succession those mentioned in foregoing paragraphs. One of the early surveys stands out, however, as of such conspicuous importance for the survey movement as a whole that it may properly be commented on at some length.

The Board of Estimate and Apportionment of New York City had been for some years prior to 1911 critical of the Board of Education of that city on account of the financial conduct of the school system and the demands made by the system on the treasury of the municipality. The Bureau of Municipal Research, presided over by William H. Allen, had made surveys of other aspects of the management of New York City and had attracted the attention of the people of the city to the need of reforms. Allen suggested a school survey to the officers of the city government and such a survey was organized. Professor Paul Hanus was employed as director of the survey. He associated with

himself eleven other workers, who took up various aspects of the school operations. Under the immediate supervision of the general Committee of the Board of Estimate and Apportionment and without special relations to Professor Hanus' work, an independent survey of the physical and financial conditions of the schools was undertaken by a staff of engineers and accountants.

The report consists of three volumes. The bulky character of the report is indicated by the statement that the three volumes weigh 16 pounds. The total cost of the survey was \$95,139.

A number of disputes arose with regard to the report. One of Professor Hanus' associates—namely, Professor Moore—had been charged with the responsibility of preparing a report on the administrative aspects of the school organization. He did not answer all the supplementary questions that were put to him by the Committee, and on this ground the Committee felt justified in refusing to accept and publish this part of the report. Thereupon Professor Moore published his report independently. The incident served as a warning to all who made later surveys. It is an accepted principle of professional ethics that no school system has a right to reject a report presented by a surveyor who has been employed to make a study of the school system. Indeed, most agreements made between surveyors and school systems now stipulate explicitly that reports shall be published without any alterations whatsoever.

A second complication arose as an outcome of the New York survey. Professor Frank M. McMurry prepared a section of the report in which he criticized severely the classroom teaching he observed in a number of the schools. He laid down certain canons of judgment that he employed in arriving at his critical pronouncements. He did not indicate how many schools he had visited or whether he had taken the precaution to make an adequate sampling. His report called forth a violent rebuttal from the Board of Superintendents.

Of a type wholly different from the report of Professor McMurry was the report of S. A. Courtis, who made a study of the achievement in arithmetic of a large number of the pupils in the New York elementary schools. Courtis had been conducting tests in arithmetic for some years prior to the New York survey. He was the author of the most elaborate arithmetic tests at that time available. He secured the advice of Leonard P. Ayres, then director of the educational division of the Russell Sage Foundation, and made an admirable and convincing sta-

tistical statement of the conditions in the schools in the particular field in which he had made his study.

The New York survey, which was in progress from 1911 to 1913, attracted nation-wide attention and may be said to be the survey that gave prestige and standing to the survey movement. Immediately, communities large and small in all parts of the country inaugurated surveys of their schools.

The survey movement, thus launched, has proved to be highly important, not only because of the information that surveys have supplied to communities and school officers, but also because of the opportunity they have given to students of the science of education to develop techniques of investigation. There can be no doubt that the rapid progress made by the science of education between the years 1910 to 1920 was in no small measure due to the extensive use in school surveys of measurement techniques and techniques of comparison. The leading members of college and university departments of education eagerly took advantage of the opportunities offered by the surveys to develop new fields and new methods of inquiry and to gather new bodies of materials regarding school organization and teaching methods.

IX. THE CLEVELAND SURVEY OF 1915-16: A HIGH POINT

A high point in the survey movement was reached in 1915-16 when Leonard P. Ayres conducted with a large staff a survey of the schools of Cleveland, Ohio. Several special features of this survey may be noted. A large part of the survey was devoted to vocational education. Tests of reading were developed and applied for the first time on a large scale in the course of this survey. A plan of publicity was organized for the purpose of making the people of the city acquainted with the results of the inquiry. During the period of publication of the reports a luncheon meeting of citizens was held each week at one of the leading hotels and copies of one section of the report were distributed and oral summaries were presented by the members of the survey staff.

X. TENDENCIES APPEARING AFTER 1915

After 1915 two distinct tendencies appeared in the survey movement.

1. Specialized Surveys

First, specialized surveys dealing with limited aspects of education became common. It was pointed out in an earlier paragraph that school

surveys were often disconcerting because of the large number of recommendations made in the report of the survey. If a single series of problems, such as those related to the improvement of school buildings, was taken up and the general work of the schools was not included in the survey, the educational system was saved the difficulties that resulted from too extensive demands imposed upon it. Several school-building surveys were undertaken. These were followed by special surveys of other single features of school organization.

2. Local Bureaus of Tests and Efficiency

The second general tendency that made itself clearly felt was the substitution for outside surveys of local bureaus of tests and efficiency within the system itself. Such bureaus made possible what came to be commonly called 'continuous surveys.' The importation of experts from outside a given system was recognized as having advantages, but increasingly these advantages were sought by adding to the administrative staff of the school system a specialist trained in methods of testing and scientific study. Not only were scientific studies of the system thus provided for, but the new expert member of the administrative staff was able also to supply various aids to the system that a group of experts studying the system for a short period could not supply.

XI. FEDERAL AND STATE SURVEYS

The number of surveys that were conducted soon began to exhaust the supply of competent surveyors. As the techniques of investigation were perfected through extensive application, the members of college and university departments of education were less willing than they were in the early days of the survey movement to devote time and energy to field work. It became difficult for school systems to secure the services of individuals who commanded the prestige necessary for acceptance by the people of a community of the results of a survey. Appeal was made to certain public agencies, such as the United States Bureau of Education, the education division of the Russell Sage Foundation, and the Bureau of Municipal Research.

The calls on the Federal Bureau were especially urgent when state systems of education organized surveys. The particular problem that first prompted state educational systems to undertake surveys was the adjustment of the state institutions of higher education to one another. An early example of a state survey of higher education was that or-

ganized by Commissioner Claxton for the State of Iowa, where the problem of reconciling the interests of the State Normal School, the State Land-Grant College, and the State University through the organization of a single board was prominently before the legislature.

Since making the survey of Iowa, the Federal Office has conducted a large number of state surveys. There have also been surveys of branches of the state educational system other than higher education. New York State had a state survey of rural education in 1922 conducted under the directorship of George A. Works, at that time Dean of the School of Education of Cornell University. The Commonwealth Fund of New York City supplied the resources necessary for this rural-school survey.

In recent years, Teachers College of Columbia University has conducted a large number of surveys, both general and special, through a division of that institution under the directorship of Professor George Strayer. This division of field work has been regarded as an organized means of giving advanced students of school administration contact with concrete school situations in a large number of centers.

XII. NATION-WIDE SURVEYS

Special mention must be made of a number of nation-wide surveys made through the United States Office of Education. The first of these was a survey of Negro education, for the support of which funds were provided by a foundation. The Congress of the United States provided the funds for four subsequent surveys dealing respectively with (1) the land-grant colleges, (2) secondary education, (3) teacher preparation, and (4) school finance. The funds for the last two of these surveys were reduced as a result of the economy program adopted during the early years of the depression, but the studies had gone far enough to produce valuable reports. These national surveys conducted by the Office of Education were organized by Commissioner Cooper. He adopted the policy of carrying on each survey with a temporary staff appointed for that particular piece of work. The regularly employed members of the Office of Education participated to some extent in the studies, but it was the view of the Commissioner that the routine work of the Office should be disturbed as little as possible by special duties of the kind involved in carrying on a national survey.

In an important sense all school surveys have national importance. No period in the history of schools in any country is as thoroughly de-

scribed and critically evaluated as is the period of education in the United States since 1910. The writers on the history of education have heretofore found it necessary to depend on the writings of educational reformers and on scattered and meager data as the basis for their statements. In the future the survey reports will make possible a far more detailed treatment of school practices for this period than has ever been possible for any earlier period.

XIII. SUMMARIES OF SURVEYS

There is no comprehensive summary of the reports on public-school systems. Indeed, the collection of these reports is difficult because they are not published for general circulation. The World Book Company reprinted and issued in book form some of the early surveys, but it was not possible for any publisher to issue the numerous survey reports that appeared after 1915.

The Carnegie Foundation for the Advancement of Teaching issued in 1937 a volume of 538 pages under the title, *Surveys of American Higher Education*, giving a very full account of all the surveys in the field referred to in the title. This volume was compiled by Professor Walter C. Eells. It contains brief reviews of 230 printed survey reports. In addition, it contains analyses of the problems dealt with, lists of the recommendations made, and a catalog of names of the members of the staffs participating in the surveys. The volume is thoroughly indexed, so that its materials are readily accessible for a great variety of purposes.

Certain remarks made by Howard J. Savage, Secretary of the Foundation, in his foreword to the volume may be quoted as contributing to the general statement regarding surveys that it is the purpose of this paper to present. Savage's comments are as follows:

The reports embodying the results of the surveyors' activities are voluminous. They vary materially in worth and in the values of the recommendations they contain, if one is to judge by the proportion of the recommendations which public and educational opinion has been strong enough to effectuate. The best of these reports have had profound and lasting effect upon the national welfare; the less practical have had small result. The fact of the matter seems to be that the acute and comprehensive study, whether national, institutional, or professional, closely knit and perfected by a single individual of marked talent for the collection, evaluation, and presenta-

tion of his material has tended on the whole to be of more value than any other type. The educational survey, like most other human enterprises, depends for its worth upon the characteristics of the person or persons responsible for it. . . .

The volume [of which this foreword is a part] presents condensations of the views of numerous persons much experienced in the art of educational surveying concerning its future. Many of these opinions forecast more and better surveys conforming more or less in type to those which have gone before. It is true that today, when an institution finds itself in difficulties, political, financial, instructional, or administrative, the first impulse is often to start a survey. But in not a few such instances the laborious collecting of data for the usual type of survey is a waste of effort and money. The corpus of surveys and studies already made includes a body of knowledge far in advance of our present performance in every phase of higher education. In the main, this body of information is freely accessible, and the generalizations which have been drawn from it are of acknowledged worth. To apply pertinent generalizations to a particular university or college, or even to an educational area, requires a minimum of fresh data. What is needed is rather the power to reason from analogy, sound judgment, administrative intuition, persuasion, and tact in dealing with certain questions which all too frequently are personal. These personal questions exist in every educational situation; it is important that they be recognized and dealt with fairly and sympathetically. The day of attempts to overwhelm opposition by a flood of statistical material is already passing. However diverse and individual our colleges and universities are—and ought to be,—each of them has access to a common body of administrative wisdom, which can be applied to new but similar conditions. Useful as educational surveys may be, their effect in many cases has been principally to corroborate conclusions arrived at long before through sound reasoning and understanding of human nature.

There is no body of material dealing with school administration as concrete and illuminating as that which is to be found in school surveys. Several universities have made the reports of surveys the basis of courses in administration and in American education in its more general aspects. This kind of course would be greatly facilitated if some agency—possibly this Society, itself—would make possible the preparation of a volume paralleling the volume published by the Carnegie Foundation, but covering the surveys of public-school systems. The generation of educators who witnessed the rise and development of the survey move-

ment is still accessible for comments on the early surveys. Much that they know which is not published in the reports would be of value in illustrating the difficulties that confronted the science of education in its early stages.

XIV. IN CONCLUSION, A PERSONAL EXPERIENCE

The present writer ventures to make a part of this paper one series of occurrences that took place in his personal experience. The city of St. Louis needed new buildings in 1916, and the Board of Education decided that it needed a survey as a means of persuading the people of the city that a bond issue for new schools was necessary. The Department of Education of the University of Chicago was invited to undertake the survey. Mr. Ben Blewett was superintendent, a worthy successor to the brilliant line of superintendents that had included Harris and Soldan. In early conferences with the director of the survey, Blewett expressed the attitude of many other superintendents of schools of that day when he said that it was entirely unnecessary for the survey staff to give any attention to problems of instruction. "We know," said Superintendent Blewett, "exactly where we stand in our school work. All that is necessary is a report on the building situation." This statement implied, as it will be recognized, skepticism about the possibility of contributions of any importance to the vital work of the schools by a group of outsiders. The director of the survey answered by saying that a complete survey had been asked for and would be made. Superintendent Blewett promptly acquiesced in spite of his skepticism and gave the staff every possible assistance. As the survey progressed, he became enthusiastic about what was found by the staff of the survey. He expressed the heartiest appreciation of the contributions made to the school system over which he presided. Superintendent Blewett became a strong supporter of the science of education because of his experience with the survey. As he expressed his attitude to the director of the survey: "I never knew that a group of outsiders could find out as much in a short time as the scientific methods which you employ have made it possible for you to find out."

The science of education has gained acceptance in other cases as it did in the city of St. Louis wherever opportunity has been afforded for the systematic scientific study of educational practices.

CHAPTER II

CONTRIBUTIONS OF RESEARCH TO EDUCATIONAL ADMINISTRATION

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I. INTRODUCTION: THE MAGNITUDE OF THE PROBLEMS

The utilization of research in educational administration is a development of the present century. Virtually no significant investigations in administration are listed in periodical literature prior to 1900. As a matter of fact, scientific research in education was scarcely considered possible before that time. The classifiers of the articles included in *Poole's Index to Periodical Literature* up to 1905 used only three titles with respect to research; namely, "scientific research," "agricultural research," and "medical research." The title, "educational research," was not used by the *Readers' Guide to Periodical Literature* until 1917. However, the need for research in educational administration, especially in city school systems, was clearly recognized and to some extent employed before the term came into professional use.

In the rapidly growing urban communities school enrollment increased at an unprecedented rate in the years following 1900. The size of the problem of providing accommodations alone for the pupils can be fully realized merely by noting the enrollment data for five large cities during the period 1900 to 1930. New York City in this period added 611,824 children to its school rolls, or an average of 20,394 pupils a year; Chicago added 268,169; Los Angeles, 255,886; Detroit, 233,325; and Philadelphia, 150,577. Providing for this increased pupil load in these five cities required the addition of approximately 1,500 new buildings and 50,000 teachers for the period, or an average of approximately 50 buildings and 1,700 teachers a year.

The problem of providing for the rapidly increasing pupil load between 1900 and 1930 was almost as great for the country as a whole.

Local resources had already been taxed practically to the limit in the thirty-year period 1870 to 1900 by an increase in public-school enrollment of eight and three-quarters million pupils, or one and one-fourth times as many pupils as the schools enrolled in 1870. The cost for capital outlay alone, not to mention the increase in disbursements for current expenses, placed an enormous burden on the local communities, which had to assume most of the load. Without any cessation in the demands for school accommodations the country was required to provide for an additional enrollment of 10,174,905 pupils in the period 1900 to 1930.

The increase in school costs was greatest in the large cities where building requirements were more exacting and where the standards for teachers were higher than in the smaller cities, towns, and rural communities. Because of the problems of growth experienced in the last three decades of the nineteenth century, the cities of New York and Chicago, for example, were less able to meet the demands for school facilities imposed by the continued growth in enrollment in the first two decades of the twentieth century. While New York and Chicago were increasing their expenditures for capital outlay during the latter period 700 and 922 percent and for current expenses 1,431 and 828 percent, respectively, Detroit, which had experienced only a moderate growth in school enrollment in the first period, was better able to provide for its phenomenal growth in the second period when it increased its expenditures for buildings 4,051 percent and its current expenses 2,856 percent.

School officials in the rapidly growing cities were called upon to solve such problems as ascertaining the best type of construction for school buildings; securing the largest possible utilization of the building space available; determining the most suitable equipment and supplies; planning the program of studies for the changing pupil personnel; and providing in-service training programs for their teachers. These problems could not be solved through mere speculation or by snap-shot decisions. Familiarity with historical and sociological background, knowledge of contemporary practices, and understanding of the facts pertaining to local conditions were required by those who accepted responsibility for helping chart the course of school progress in the cities in question.

Problems in educational administration virtually as complex as those described in the rapidly growing cities also confronted the states in adjusting educational systems created for pioneer conditions to

meet the needs of the changing social order. Here the lag between law and practices was frequently found to be very great.

II. CONTRIBUTION OF HISTORICAL STUDIES

The solution of the problems that confronted the school officials in state, city, and other units demanded a greater centralization of administrative power than the people were frequently willing to grant. As a result, lay officers in many communities muddled along, wasting the school money and providing unsuccessful solutions to the pressing problems confronting the schools. Professional leaders, however, gradually made progress in obtaining grants of power from state legislatures thus permitting the exercise of an increasing degree of centralized authority in the administration of schools.

In the struggle to acquire centralized authority professional school administrators were aided by the growing tendencies towards centralization in civil government. Students of governmental problems gave a true perspective to the issue of centralization by substantial historical research¹ at the turn of the century when problems in both civil and school affairs were pressing for solution.

¹ Examples of these studies are: Harold M. Bowman. *The Administration of Ohio—A Study in Centralization*. (Columbia University Studies in History, Economics and Public Law, Vol. 18, No. 1, 1903)

John A. Fairlie. *The Centralization of Administration in New York State* (Columbia University Studies in History, Economics and Public Law, Vol. 9 1897-98)

Frank J. Goodnow. "The growth of executive discretion." *Proceedings of the American Political Science Association*, 2: 1905, 29-44.

Samuel P. Orth. *The Centralizing of Administration in Ohio*. (Columbia University Studies in History, Economics and Public Law, Vol. 16, 1902-3)

William A. Rawles. *Centralizing Tendencies in the Administration of Indiana* (Columbia University Studies in History, Economics and Public Law, Vol. 17 1903)

Frank Rollins. *School Administration in Municipal Government*. (Columbia University Contributions to Philosophy, Psychology, and Education, Vol. 11, No. 2 1902)

Charles H. Thurber. *The Principles of School Organization*. (Clark University thesis, Worcester, Massachusetts, 1900)

William C. Webster. *Recent Centralizing Tendencies in State Educational Administration*. (Columbia University Studies in History, Economics and Public Law, Vol. 8, No. 2, 1896)

James T. Young. "The relation of the executive to the legislative power." *Proceedings of the American Political Science Association*, 1: 1904, 47-54.

Just what direct influence these studies exerted on school administration is difficult to determine. The evidence appears to show that the issue of centralization versus decentralization presented as great a problem in education to these students of government as it did in civil administration. Two of the nine studies listed dealt specifically with school administration; the seven dealing with civil affairs also treated school administration in relation to civil government. It seems reasonable to assume that school administrators who were beset with perplexing problems that could not be solved by speculation would turn to scientific research in related fields for light. That the research in question helped to clarify the issue that was basic in the solution of the pressing school problems cannot be doubted.

Since historical research was virtually the only type of scientific investigation with which school administrators were familiar in the first decade of the period under discussion, it was natural that the solution to current problems in administration would be approached in the light of historical development. Accordingly, historical investigations constituted the major contributions to school administration up to about 1910. Some of the problems in administration investigated by this method were (1) the status of the city school district,² (2) powers and responsibilities of city school superintendents,³ (3) methods of apportioning school funds,⁴ (4) fiscal problems in educational administration,⁵ (5) the certification of teachers,⁶ (6) provisions for exceptional children,⁷ and (7) the rise of school supervision.⁸

The historical research carried on in the first decade of the present

² Harry E. Bard. *The City School District*. (Teachers College, Columbia University, Contributions to Education, No. 28, 1909)

³ Arthur H. Chamberlain. *The Growth of Responsibility and Enlargement of Power of the City School Superintendent*. (University of California Publications in Education, No. 4, 1913)

⁴ Ellwood P. Cubberley. *School Funds and Their Apportionment*. (Teachers College, Columbia University, Contributions to Education, No. 2, 1905)

⁵ Edward C. Elliott. *Some Fiscal Aspects of Public Education in American Cities*. (Teachers College, Columbia University, Contributions to Education, No. 6, 1905)

⁶ Ellwood P. Cubberley. "The Certification of Teachers." (*Fifth Yearbook, Part II*, of this Society, 1906)

⁷ Ella Flagg Young. *Isolation in the School*. (Doctor's Dissertation, Department of Education, University of Chicago, 1900)

⁸ Henry Suzzallo. *The Rise of Local School Supervision in Massachusetts*. (Teachers College, Columbia University, Contributions to Education, No. 3, 1906)

century exerted an important influence on school legislation. In approximately half the states constitutions were either revised, or revisions were attempted, between 1900 and 1930. School laws were recodified in twenty-eight states. The changes in the laws were designed to permit a greater centralization of power over schools by state boards of education, state superintendents of public instruction, and professional administrative officers in local school units. An examination of the sections pertaining to education in the revised constitutions and of the school laws enacted since 1910 shows that the members of the legislative bodies in most of the states were influenced by the conclusions of the historical studies cited in the foregoing footnotes.

III. CONTRIBUTION OF STATISTICAL RESEARCH

The use of statistical investigations in educational administration began around 1907. Professor Thorndike in that year drew some startling conclusions from certain statistical data that he had analyzed for the United States Bureau of Education with respect to the elimination of pupils from school.⁹ His findings were regarded as an indictment of the efficiency of those responsible for the progress of children in school. While school administrators were critical of his generalizations, they nevertheless recognized that his method of investigation, if utilized in the study of school problems, might contribute much to the improvement of educational administration. In the same year Dr. Leonard P. Ayres, of the Russell Sage Foundation, made a study of pupil failure in the New York City schools, with the approval and support of Superintendent Maxwell, who published some of Ayres' findings in his annual report in 1908. The following year Ayres published his study in full in book form under the title, *Laggards in Our Schools*.¹⁰ This volume was widely read by school administrators and was used by them as a pattern for the study of problems pertaining to the composition and character of the school population.

The influence of Thorndike and Ayres on educational administration was far-reaching. Superintendents began to employ statistical methods in the analysis of school facts. Their annual reports took on a new character. Statistical tables were presented showing the age-grade dis-

⁹ Edward L. Thorndike. *The Elimination of Pupils from School*. (U. S. Bureau of Education Bulletin, 1907, No. 4. Washington, D. C.: Government Printing Office, 1908. 63 pp.)

¹⁰ Leonard P. Ayres. *Laggards in Our Schools*. (Russell Sage Foundation: New York, 1909)

tribution of pupils, the percentage of failures and withdrawals by grades, and other pertinent findings. They quickly discovered that statistical analysis was essential to clear thinking when quantitative data had to be dealt with. With this method of investigation administrative officers could find a rational basis for policies in both organization and internal administration.

Departments of education in universities developed courses of instruction in statistical methods for the training of administrative officers and technicians in this type of research. Professor Thorndike contributed a text on mental and social measurement¹¹ for use in such courses. The text was difficult reading for the average practitioner in administration, but it stimulated students with technical training to contribute to a rapidly growing literature on statistical methods in the study of school problems.

The interest in statistical method on the part of school administrators gave rise to the establishment of bureaus of educational research in city school systems and state departments of education. The city of Baltimore is credited with being the first large city to establish such a bureau (1912). Other large cities followed the precedent of Baltimore rapidly, until at present there are relatively few cities of 50,000 population or more that do not maintain some sort of definitely-organized research service for fact-finding and statistical analysis. In many of the smaller cities, the superintendents organize their staffs so that the services in question can be carried on informally by various staff members. Most of the state departments of education have set up statistical divisions to collect data from all the school units of the state and to refine and interpret the data for the use of the state superintendent in the formulation of policies as well as such other persons who may be interested in the study of school conditions.

The wide application of statistical research in educational administration has been fully demonstrated by Chapman,¹² who analyzed the activities performed by bureaus of educational research in 58 city school systems in 1926. The list of 41 activities performed by the members of the research staffs in the school systems studied clearly indicates the dependence of administrators on reliable statistical data in the organization and administration of their schools.

¹¹ Edward L. Thorndike. *An Introduction to the Theory of Mental and Social Measurements*. (Teachers College, Columbia University: New York, 1913. 277 pp.)

¹² H. B. Chapman. *Organized Research in Education*, p. 173. (Ohio State University Press: Columbus, Ohio, 1927)

One of the phases of educational administration to which statistical method has been effectively applied is that of school finance. The use of the method in the study of school income and expenditures by superintendents and research staffs has led to a general diffusion of knowledge with respect to the problems of school support and to a marked improvement in business practices. Whereas, formerly, the administration of school finance was thought by board members to present problems that could be solved only by persons with experience in business affairs, now the administration of finance is generally regarded as the task of a person with professional training. The change in attitude has resulted very largely from the demonstrated understanding and grasp of financial problems by school administrators made possible by the use of statistical method in the collection, analysis, and interpretation of data pertaining to school finance.

The extensive research in school finance during the last fifteen years has produced a body of knowledge of great use to school administrators in the study of their problems. As a matter of fact, the question of cost is so basic to the consideration of most of the problems in school administration that administrative officers must either constantly carry on financial research or yield their leadership to persons who do.

IV. CONTRIBUTION OF OBJECTIVE MEASUREMENT

The development of the measuring movement and the perfection of tests for the measurement of achievement and mental capacity have made possible great advances in educational administration. Between 1900 and 1910 problems in administration, such as the classification of pupils, the appraisal of pupil progress, the diagnosis of disabilities in learning, the identification of special aptitude, the promotion of pupils, and the appraisal of the relative effectiveness of different types of curricular material and different methods of teaching could not be studied objectively and scientifically by administrative officers. Now, objective tests are used extensively in the general appraisal of the mental status and the school achievement of pupils as a basis for the solutions of problems pertaining to the curriculum and the adjustment of the pupil personnel.

The wide use of objective tests in administration is attested by the large sale of such material by commercial publishers and the enormous quantity of home-made tests and examinations prepared and duplicated annually in local schools. The factual data thus rendered available for the use of administrative and supervisory officers as well as teachers

have contributed greatly to the science of education, especially in recent years.

The contributions of this type of research to the solution of problems in educational administration increased rapidly after 1914, the date on which the Department of Superintendence adopted by a favorable vote the report of its Committee on Tests and Standards. By this action the Department reversed its position of two years before, when in a heated session it had rejected a motion designed to commit the members to the use of objective measurement.

V. CONTRIBUTION OF THE SURVEY MOVEMENT

The survey movement in its relation to educational administration represents a definite realization of a long recognized need. From earliest times in America persons charged with administrative responsibility for schools have experienced both a constant need for extensive appraisal as a basis for future improvement and a genuine desire for comparison with the successful practices of similar systems. Since 1910 contributions to both needs in educational administration have rapidly grown as the technique of the school survey has been perfected and the fund of knowledge for comparative purposes has been increased.

While the opinion of administrators is often divided as to the specific contributions of the survey in local school situations, it is generally agreed that its contributions to school improvement have been great. Surveys in the main have been followed by changes in administrative practices directly or indirectly traceable to findings and recommendations. Evidence by Caswell¹³ collected from 50 school systems that had experienced comprehensive surveys shows that changes in 87 out of 88 administrative practices and procedures were attributed either directly or indirectly to the influence of the survey. Further evidence of the contribution of the survey movement to educational administration has been assembled by Sears¹⁴ in a comprehensive treatise entitled *The School Survey*. Professor Sears supports the thesis that research is the only rational means of intelligently carrying on administrative processes in a modern school system.¹⁵

¹³ Hollis L. Caswell. *City School Surveys*, pp. 54-80. (Teachers College, Columbia University, Contributions to Education, No. 358, 1929)

¹⁴ Jesse B. Sears. *The School Survey*. (Houghton Mifflin Co.: Boston, 1925. 44 pp.)

See also Chapter I of this Yearbook for a discussion of school surveys by Judd.—*Editor*.

¹⁵ *Op. cit.*, p. 426.

VI. CONTRIBUTION OF LABORATORY EXPERIMENTS

The outcomes of laboratory experiments began to influence educational administration during the decade 1910 to 1920. In the previous decade considerable attention had been given to the perfection of objective measuring devices for use in clinical studies and to the study of individual differences in children. Through the laboratory and the clinic, findings were made that threw much light on phases of supervision, such as methods of teaching the different subjects, organization of teaching materials, new types of instructional equipment, factors pertaining to the hygiene of instruction, and the like.

By the end of the decade under discussion, administrative officers had laboratory evidence, for example, that made possible the establishment of a better balance between oral and silent reading¹⁶ and the guidance of pupils in the development of fundamental reading habits.¹⁷ The laboratory also yielded a technique for the use of teachers in the diagnosis and treatment of remedial cases in reading.¹⁸ Comparable results with respect to the learning and teaching of other school subjects, such as arithmetic, spelling, and writing, soon followed. Since 1920, the literature of education in both elementary-school and secondary-school subjects is replete with laboratory studies that have directly influenced the organization and administration of the instructional program. These studies have made possible the use of scientific method¹⁹ in planning and carrying out supervisory programs.

Laboratory investigations have been especially valuable to administrative officers in recent years in the reorganization of curricular materials. Such investigations have contributed to the clarification of objectives, the improvement of methods, the enrichment of content, and

¹⁶ C. H. Judd. *Reading: Its Nature and Development*. (Supplementary Educational Monographs, No. 10. Department of Education, University of Chicago, 1918. 192 pp.)

¹⁷ G. T. Buswell. *Fundamental Reading Habits: A Study of Their Development*. (Supplementary Educational Monographs, No. 21. Department of Education, University of Chicago, 1922. 150 pp.)

¹⁸ W. S. Gray. *Remedial Cases in Reading: Their Diagnosis and Treatment*. (Supplementary Educational Monographs, No. 22. Department of Education, University of Chicago, 1922. 208 pp.)

¹⁹ *Scientific Method in Supervisory Programs*. (Seventh Yearbook of the Department of Supervisors and Directors of Instruction of the National Education Association. Bureau of Publications, Teachers College, Columbia University: New York, 1934. 194 pp.)

the scientific placement of instructional materials in the school curriculum with respect to the age and grade levels of pupils. As a result, administrative officers have been able to plan programs of in-service training for teachers with respect to what to teach, how to teach, and where to teach.

The work of the experimental laboratory has also made possible the scientific study of learning problems in local schools. Pupils who formerly failed and were eliminated from school in the course of time because they could not learn are now studied by psychologists, guidance officers, special supervisors, and teachers in the light of test results and social case histories, and after diagnosis are given corrective or remedial treatment. The contributions thus made in the experimental laboratory have enabled administrative officers to establish types of personnel service unknown to schools at the beginning of the present century.

VII. CONTRIBUTION OF QUESTIONNAIRE FINDINGS

School administrators have always relied on contemporary practice as a means of improvement. Before the questionnaire came into use as a method of investigation, administrative officers in leading school systems often visited other systems to study innovative practices. The development of the questionnaire, however, has made possible a wider dissemination of current practices than was formerly possible. Now such studies are often used in fact-finding investigations, and frequency of practice has become an important principle in educational administration.

Questionnaire studies and check-list investigations, including the reports made to state departments of education and the United States Office of Education, constitute the chief source of information regarding current practices in educational administration. Such investigations have been conducted on a national scale in recent years as a means of determining current status in secondary education,²⁰ teacher education,²¹ and school finance.²² The findings thus made possible have resulted in important changes in policies and in the dissemination of innovative administrative practices.

²⁰ National Survey of Secondary Education. (28 volumes. U. S. Office of Education Bulletin, 1932, No. 17)

²¹ National Survey of the Education of Teachers. (6 volumes. U. S. Office of Education Bulletin, 1933, No. 10)

²² *State Support for Public Education and Research Problems in School Finance*. Washington, D. C., 1933. (American Council on Education)

This method of research, where wisely used, has contributed much to the improvement of practices and procedures in educational administration. However, when modal practices have been accepted as best practices without critical evaluation, great harm has not infrequently resulted. The use of frequency data within logical limitations has stimulated administrative officers to survey, analyze, consider, and evaluate current practices in local school systems in the light of similar data in contemporary systems, with the result that provincialism has been overcome and the science of educational administration advanced.

VIII. CONTRIBUTION OF LEGAL RESEARCH

The importance of a knowledge of school law in administration has become increasingly important as school systems have grown and problems of management have multiplied in recent years. The exercise of discretionary power by boards of education has resulted in many cases being carried to the courts for interpretation. As a result, it is essential that school administrators be well informed regarding the precedents established by the courts as well as regarding constitutional and statutory enactments pertaining to school organization and control.

Without the research carried on in school law, administrative officers would be greatly handicapped in their knowledge of legal procedures. Sources of information with respect to statutory enactments and judicial decisions would seldom be available to the average board of education or administrative officer. Furthermore, legal practitioners in local communities would likewise be little better informed than school officers regarding judicial interpretations of school cases on account of the scattered character of the case reports.

One of the earliest contributions to legal research was that of Elliott²³ who undertook to compile for the United States Department of Education in 1906 and 1909 the legislation and judicial decisions pertaining to public education in the several states. The influence of this contribution is apparent in the number of legal researches that

²³ Edward C. Elliott. *State School Systems: Legislation and Judicial Decisions Relating to Public Education, October 1, 1904 to October 1, 1906*. (U. S. Bureau of Education Bulletin, 1906, No. 3. Washington, D. C.: Government Printing Office, 1907. 145 pp.)

Edward C. Elliott. *State School Systems: Legislation and Judicial Decisions Relating to Public Education, October 1, 1906 to October 1, 1908*. (U. S. Bureau of Education Bulletin, 1908, No. 7. Washington, D. C.: Government Printing Office, 1909. 364 pp.)

followed, a few of which are herewith cited.²⁴ Today a school officer can take from his desk a copy of Trusler,²⁵ Weltzin,²⁶ or Edwards²⁷ and ascertain the legal status of almost any problem arising in the organization and administration of schools. Moreover, by subscribing for the publication entitled, *The Yearbook of School Law*,²⁸ a school official can keep himself informed regarding current changes in school law and important legal interpretations by the courts.

IX. CONCLUSION

This brief analysis of the contributions to educational administration from the seven types of research considered reveals results of major importance. Conditions prevailing in school organization, administration, and support at the beginning of the present century were highly complicated, and previous experience failed to provide adequate precedents for the solution of the problems with which administrative officers were faced. The contributions of research gradually pointed the way to the satisfactory solution of many of the problems. Thus, by utilizing the findings of the various types of research, educational administration has been advanced within a period of thirty-seven years from the practice of empirical remedies to the status of scientific management.

²⁴ Harry E. Bard, *op. cit.*

Harry C. Voorhees. *The Law of the Public School System of the United States*. (Little, Brown and Co.: Boston, 1916)

J. Cayce Morrison. *The Legal Status of the City School Superintendent*. (Warwick and York: Baltimore, 1922. 162 pp.)

Newton Edwards. *Constitutional Basis of Public School Administration*. (Unpublished doctor's dissertation, University of Chicago, 1923)

Grover C. Morehart. *The Legal Status of City School Boards*. New York, 1927. (Teachers College, Columbia University, Contributions to Education, No. 270. 96 pp.)

Ralph Yakel. "The city government and its control over school expenditures." *American School Board Journal*, 79: August, 1929, 39-41, 126.

²⁵ Harry R. Trusler. *Essentials of School Law*. (Bruce Publishing Co.: Milwaukee, 1927. 478 pp.)

²⁶ Frederick Weltzin. *The Legal Authority of the American Public School*. (Mid-West Book Concern: Grand Forks, North Dakota, 1932. 286 pp.)

²⁷ Newton Edwards. *The Courts and the Public Schools*. (University of Chicago Press: Chicago, 1933. 591 pp.)

²⁸ *Yearbook of School Law*. (M. M. Chambers, editor. American Council on Education: Washington, D. C.)

CHAPTER III

CONTRIBUTIONS OF RESEARCH TO THE EDUCATION OF TEACHERS

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I. INTRODUCTION

In attempting to evaluate the contributions of research to the education of teachers, it is necessary to make some arbitrary limitations. Two of them will be given here; others will become clear as this chapter is read.

The field of teacher-education has been interpreted to include any work done, under the direction of a formally organized educational agency, by a teacher or a prospective teacher, the primary purpose of which is to prepare for teaching or to improve the teaching services of the persons doing the work.

The liberal definition of 'research' proposed by the Yearbook Committee and stated by its Chairman in his Introduction is, of course, accepted for the field of teacher-education. Without this broad interpretation the number of research contributions to the education of teachers would have been relatively few and confined to the latter half of the period being studied.

Research studies have been included when their findings contribute to a clearer realization of the work for which teachers should be prepared as well as when their findings indicate better methods by which to prepare them for that work, even though the studies may have been directed toward some field other than the education of teachers.

At the beginning of this century large numbers of teachers were certificated by city and county superintendents after passing examinations covering little more than the subject matter of the elementary schools, and it was still possible in all but a very few of the normal schools to enter one-year and two-year courses upon the completion of the eighth grade. Curricula for teachers consisted largely of courses in methods and devices of teaching and reviews of the subjects to be taught.

With this brief statement as a starting point, some developments in the field of teacher-education will be traced and then the relation between those developments and the studies that have been made in the field will be indicated.

II. GENERAL CHANGES IN THE EDUCATION OF TEACHERS SINCE 1900

Accompanying or resulting from the development of the whole educational system are certain general changes that have affected teaching and the amount of preparation of teachers.

1. Increased Demands for Able Persons

From 1900 to 1934 the enrollment in the elementary schools increased 70.5 percent, that of the secondary schools 991.8 percent, while the number of teachers increased by 100.2 percent to well over a million individuals. During that period a number of educational changes occurred that increased the desirability of teaching as an occupation and magnified the problems involved in supplying the needed recruits for teaching and in providing the professional in-service training or stimulation desirable for many teachers.

The educational surveys described in Chapter I did much to bring to the attention of school patrons the need for some of these changes. Data assembled and disseminated by the United States Bureau of Education (hereafter referred to as the 'U.S. Bur. of Ed.') on average daily attendance and length of school terms were undoubtedly responsible for creating a public opinion favorable to longer school terms. The emphasis given during the early part of this period by Cubberley, Strayer, and the U.S. Bur. of Ed. to age-grade tables and to the problems of retardation, elimination, and maladjustment revealed by such tables did much to promote expansions of public-school services and demands for increases in the preparation of teachers.

2. Improved Conditions under Which Teachers Work

The improvement in conditions, both financial and educational, under which teachers work today is very marked when compared with those prevailing at the beginning of this century.

a. Financial. At the beginning of this period (1900) teachers received an average salary of about \$45.00 a month and, except in the cities, often for terms as short as 3 to 6 months. Today, four-fifths of

all cities and some states have salary schedules that, in general, provide higher salaries for teachers than at any time in our history, except the period just preceding 1929. Today nearly one-half (22) of the states also provide some form of tenure legislation for teachers and over four-fifths (39) have made either statewide or partial provision for the retirement of teachers.

Salary conditions for teachers have been very directly affected by a number of research studies, the most influential of which have been sponsored by the National Education Association (hereafter referred to as N.E.A.) committees or in recent years by the Research Division of the N.E.A. In 1905, a N.E.A. committee presented a 466-page report on salary conditions. In 1914, the better known survey of teachers' salaries by Boykin and King—*The Tangible Rewards of Teaching*—did much to call attention to the very low salaries then received by teachers. The report, by the author of this chapter, prepared for the N.E.A. Commission on the Emergency in Education in 1919 was the first of a series of biennial reports on teachers' salaries and salary schedules in the United States. Except for the 1923 report these were published as studies of the Research Division of the N.E.A. (directed by J. K. Norton up to 1931 and by W. G. Carr since that date). Numerous other studies and reports of N.E.A. committees under such titles as, *Practices Affecting Teacher Personnel*, *The Teacher's Economic Position*, *Efficient Teaching and Retirement Legislation*, and *The Problems of Teacher Tenure* have kept these economic phases of the teacher's work to date and have helped to mould the public's favorable attitude toward them.

The work of the N.E.A. has been greatly enhanced by a large number of salary studies for individual cities and by the systematic analyses of salary problems by Almack and Lang, L. W. Bartlett, W. S. Elsbee, Lester Dix, L. L. Morris, D. W. Peters, R. P. Bowles, L. P. Young, and others.

As for salaries for college teachers, the data gathered by the Carnegie Foundation for the Advancement of Teaching, by the Association of American Colleges, and by Trevor Arnett of the General Education Board have done for institutions of higher education what the N.E.A. studies have done for the public schools.

b. Educational. The second phase of improved general conditions under which teachers work has to do with such matters as the size of the classes taught, the quantity and quality of instructional materials

provided, and the amount and kind of special assistance from supervisors, special teachers, and other assistants. Research studies conducted in these fields have helped to make teaching more desirable. For example, the studies by W. S. Monroe, Paul Stevenson, Earl Hudelson, F. M. Quance, and others implied that large classes made for a type of educational program not favored by many educators and that they probably had other effects not yet accurately measurable but that are probably undesirable.

Another phase of this general improvement has been the development of a large group of professionally prepared supervisory specialists. This development created numerous desirable positions and also made desirable and possible a higher degree of specialization among classroom teachers. Research studies in the field of general supervision that aided these developments were made by M. S. Pittman, A. S. Barr, W. H. Burton, L. J. Brueckner, E. O. Melby, Lelah M. Crabbs, and many others. Additional studies have been analyzed and presented in the Eighth Yearbook of the Department of Superintendence (*The Superintendent Surveys Supervision*), in the seventh and other yearbooks of the Department of Elementary Principals of the N.E.A., in the Proceedings of the Supervisors of Practice Teaching, and in the yearbooks of the National Conference on Educational Method.

3. Improved Professional Attitudes among Teachers

A very noticeable improvement in the professional attitudes among teachers has been manifested in a variety of ways. In 1900 there were only 2,332 members of the N.E.A.; in 1935 there were 187,645. By means of such increased support the larger organizations have been able to carry out regular programs of research, plan campaigns of professional advancement, aid in the passage of desirable laws, and meet emergencies that threaten the present or future work of the schools.

4. Higher Standards and Improved Methods of Certifying Teachers

Some of the most significant of the changes in certification have been initiated or greatly accelerated during this period, and have been accomplished largely without the direct aid of research studies. Even so, they have come more rapidly and have been accepted in more states because of such studies as the summaries and digests prepared in the U.S. Bur. of Ed. by Harlan Updegraff, W. R. Hood, and later by Kathe-

rine M. Cook; the studies by W. A. Yeager, M. E. Stine, and W. A. Zaugg; the tracing of certification trends in connection with the National Survey of the Education of Teachers (hereafter referred to as N.S.E.T.) by B. W. Frazier; the discovery of the more commonly found teaching combinations of subjects among secondary teachers (Volume II of the N.S.E.T.); and the two extensive surveys and analyses of practices in certification by Frank P. Bachman.

III. SPECIFIC CHANGES IN THE EDUCATION OF TEACHERS SINCE 1900

Nearly every change in education and in educational practices has some bearing upon the education of teachers. The remainder of this chapter will be devoted to changes and research studies more *specifically* and *directly* related to the education of teachers.

1. Increased Amount of Preservice Education of Teachers, Especially of Elementary and Rural Teachers

The marked increase in the amount of preservice education expected and demanded of teachers has had three aspects, each enhancing the effect of the others: the period of preservice preparation has been lengthened; its beginning has been advanced; and a more thorough mastery of the fields to be taught has been required.

One of the most significant studies relating to the amount and quality of the preparation of teachers is the Report of the Committee on Normal Schools, presented after four years of work by its chairman, Z. X. Snyder, in the N.E.A. Proceedings, 1899. This summary of investigations and analyses indicated that the ideal preparation toward which all normal schools should strive was a two-year course based on a high-school education or its equivalent. The report of that Committee did much to call attention to the low standards prevailing for the education of teachers and also to popularize the idea that teacher-education should be raised to the collegiate (post-secondary) level.

That even the provisional course (four years beyond grammar school) recommended in 1899 was far ahead of practice is shown by a number of studies of the educational qualifications of the teaching population. Coffman called attention to the fact that the typical teacher in 1911 began teaching with only three or four years educational preparation beyond the elementary school, while as late as 1918, data prepared by Bagley suggested that more than three-fifths of the ele-

mentary teachers of the country had no more than two years of work beyond the high schools. The N.S.E.T. gave for the year 1930-31 the most complete picture of the educational equipment of America's teachers that has been assembled and called attention to the inequalities among states, among cities of different sizes, between urban and rural schools, between white teachers and Negro teachers, and between American teachers and those of England, France, Germany, and Sweden.

Vernon L. Mangun, Ned H. Dearborn, E. R. Mosher, B. W. Frazier, and Jessie Pangburn have traced the development of normal schools and teachers colleges in the United States. C. H. Judd, J. I. Baugher, F. J. Kelly, J. G. Meyer, Earle Rugg, and W. E. Peik have contributed studies that have stressed the need for extending the length of the period of preservice education of teachers.

2. Increased Number and Importance of Professional Elements in the Preservice Education of Teachers

The development of education and psychology as fields of special study has been so rapid and extensive during this period and has so directly affected the education of teachers that this specific change will be presented under a series of sub-headings.

a. The Development of Education as a Field of Special Study. In the period under discussion many subdivisions of the larger field of education have become fields of specialization comprising so much informational content that many courses are offered in each subject—many more than can be taken by the 'specialist,' let alone by the 'generalist,' the classroom teacher. These are all fields in which much research has been done and in which the developments are of interest to a teacher or are essential parts of his professional equipment. Walton C. John found in his N.S.E.T. study that the 132 graduate courses in education offered in 12 universities in 1900 had multiplied to 1636 by 1930. Many of these grew out of, and later contributed to, research.

b. The Development of Principles and Techniques of Curricular Construction. With each change or development in the fundamental theories of the educative process and with each new development or discovery in the field of learning, some phase of the curriculum—its content or its arrangement—becomes inadequate or in need of adjustment. As participants in the revision of curricula, prospective teachers now must be made familiar with the several types of curricula and must

be given some practice in the techniques for selecting and evaluating curricular materials.

Dewey, Bobbitt, Morrison, Wirt, Parkhurst, Kilpatrick, Charters, Gray, Washburne, Hopkins, Mossman, Bruner, and Stratemeyer have contributed or encouraged studies that have aroused a nation-wide interest in newer forms of curricular materials and their adaptation by classroom teachers and supervisors to the needs of specific individuals and specific communities.

c. *The Development of Methods of Measuring Educational Procedures.* Beginning with Binet's attempts to measure innate intelligence and proceeding through the development of standardized scales and tests to the statistical analysis of educational data, this important phase of a teacher's educational equipment has developed almost entirely during the period since 1900. The contributions of Rice, Thorndike, Terman, Ayres, Hillegas, Freeman, Bagley, Courtis, Trabue, Thurstone, Otis, Woody, Haggerty, Brueckner, T. L. Kelley, and many others are well known to students of this field. The work of Ben Wood, Gray, Ruch, Charles Russell, McCall, Toops, Weideman, and others had popularized the introduction of 'new-type' tests—more easily and accurately scored and more susceptible to quantitative treatment and interpretation. A knowledge of the values and limitations of the available tests and scales in a teacher's field, an ability to construct and use new-type tests, and an understanding of test scores are now considered essential to the adequate preparation of any teacher.

During the latter part of this period there has developed an interest in attempts to evaluate the effectiveness of teaching in terms of measured changes in the pupils. Attempts, in educational surveys, to measure the achievement of pupils as an index of the school's effectiveness have admittedly been limited by the number of measures available and also by the fact that many desirable results of good schools are not yet subject to satisfactory measurement.

Many of the better known of the studies that attempted to measure the effectiveness of teaching in terms of pupil achievement were reviewed and summarized in a section of the fifth volume of the N.S.E.T. by Gilbert L. Betts. Another helpful analysis of this problem is contained in the volume of the Kappa Delta Pi research publications on *The Measurement of Teaching Efficiency*, by Lancelot, Barr, Torgerson, Betts, and others. Over two hundred studies in this field are referred to or quoted in the two references just given and the list is far from being

complete. Many of the studies of teaching success, in addition to their actual findings, have made real contributions by discovering difficulties to be overcome, by more sharply defining the limitation of existing measures, and by indicating the need for clearer and more definite statements of educational aims and objectives at different levels of the educational system.

Another important phase of this development has been the increased use of statistical techniques in the study of educational problems. The ability, supplied through the use of these techniques, to deal more easily with group measures, to control or account for the effect of variables, and to discover relations and trends has made contributions possible to almost every phase of a teacher's work; for example, the most legible size and form of type, the optimal temperature and humidity for school-rooms, and the most effective form of heating system. So much use is now made of the simpler forms of statistical analysis that a teacher can no longer read his professional books and magazines intelligently without an understanding of them. The refinements permitting the increased use of statistics have been due to the work of experts like Thorndike, T. L. Kelley, Thurstone, W. S. Monroe, Holzinger, O'Rourke, Spearman, and others. M. G. Park's study of the place occupied by the training in objective measurement in the preparation of elementary teachers showed the importance that this material has already assumed in curricula for teachers.

d. Increased Emphasis on the Study of Techniques of Teaching and on Attempts to Isolate Elements of Successful Teaching. The contributions of research under these headings fall into several groups.

(1) *The Relation of Teaching to the Theories of Education.* During the time of the Herbartian influence the techniques of teaching were formal and the research contributions consisted in the selection and presentation of type studies. The studies by Thorndike and others casting doubt on the doctrine of formal discipline and emphasizing the extent of individual differences, combined with Dewey's 'growth' philosophy of education, shifted the emphasis to individualized instruction and teaching by means of pupil-motivated projects. These were submitted to statistical analysis by Washburne, Collings, Breed, Barr, Mort, Melby and Lien, Wrightstone, Gates, and others with widely divergent results. Further changes were made as a result of the findings of behaviorists, the discoveries of the importance of the physiological phases of learning, especially glandular activities and resulting emo-

tional responses, the theories of the various groups of psychologists and psychiatrists that emphasized the importance of repressions and personality integration, and the theses of the Gestalt and organismic groups that stressed the larger patterns in the educative process.

Several studies have contributed to the formulation of educational theories consistent with the findings of the different groups of psychologists or to the raising of questions concerning the validity or practicability of the theories in such ways as to sharpen definitions and clarify issues. Among these may be mentioned those by Kilpatrick, Bagley, Terman, Freeman, Judd, Bode, Horn, Harold Rugg, Briggs, Gates, Zirbes, Speer, Mossman, and Demiashkevich.

(2) *The Development of Methods of Teaching for Special Subjects.* These methods are presented in later chapters. Most of the studies in the subject-matter fields involve problems of difficulties in learning—economy, permanence, utility, and enjoyment. To that extent such studies immediately add to the professional knowledge to be mastered by teachers and affect the practices of demonstration and practice schools.

(3) *The Development of Teaching Skills.* This group of studies is concerned with the problems of developing, by means of observation, participation, and practice during the preservice period of preparation, the required degree of skill in the actual teaching of children at the age level and grade level for which the teacher is preparing to teach. In the 1899 report of the N.E.A. Committee on Normal Schools, the section on the practice school, prepared under the direction of Frank McMurry, contained twenty-nine theses on the place of the practice school in the education of teachers. The next impetus to the study of the practice school came with the Carnegie Foundation report by Learned and Bagley. That stressed the importance of observation and practice in the professional preparation of teachers for any type of school, pointed out the very limited use being made of the practice schools, and recommended a number of ways in which the practice school could be made the principal focus for the professional phases of curricula for teachers.

Beginning with L. M. Wilson's study in 1919, researches dealing directly with various problems of the practice school were conducted by H. C. Pryor, H. N. Fitch, N. L. Garrison, A. R. Mead, W. D. Armentrout, J. G. Flowers, Edna Marshall, W. W. Charters and D. Waples, L. A. Eubank, L. K. Ade, Arthur Jarman, R. F. Strebel, E. C. Class, F. K. Foster, Esther M. Nelson, and E. I. F. Williams. As a result of

these and other investigations the laboratory school as a place for observation, participation, practice—and in some cases, experimentation—has become the most important unit in the physical and educational aspects of the professional preparation of teachers, not only for normal school and teachers colleges, but equally for colleges and universities offering curricula for teachers or whose graduates apply for certification.

(4) *The Development of Diagnostic Teaching.* This recent development is concerned with the diagnosis of learning difficulties and the development of methods of remedial treatment. These matters are treated more fully elsewhere in this volume, but studies like those by Thorndike, Gates, Gray, Buswell, Yoakam, Horn, F. B. Knight, G. D. Stoddard, and many others have radically changed the nature of methods courses in the teaching of the subjects taught in the schools, especially the elementary school. Many new and refined experimental techniques have made more nearly accurate both diagnosis and the selection of reliable methods of remedial treatment. Every study in this field makes an immediate addition to the content of curricula for teachers.

Another set of important developments in teaching techniques has come in connection with the many studies that have been made to discover the most effective means of teaching atypical children. The findings of such investigators as Terman, Pintner, Leta S. Hollingsworth, Goddard, Wallin, Brueckner, Symonds, Frampton, Elsie H. Martens, Featherstone, Melby, L. M. Schleier, Meta Anderson, G. L. Hilleboe, E. T. Myers, H. G. Rowell, and many others (including those just mentioned in relation to remedial teaching) have suggested numerous improvements in the techniques of teaching normal children and have put the teaching of atypical children upon a scientific, rather than a sentimental, basis.

(5) *The Development of Auditory and Visual Aids to Instruction.* The recent improvements in the making and in the reproduction of sound films for classroom use, combined with the improvements in the radio, are opening possibilities for changed methods of teaching and of curricular construction that are probably but dimly realized at present. Already the State of Pennsylvania requires all prospective teachers to have a course in the operation of various visual and auditory aids. Some pioneer studies in the use of the motion picture in education are the experimental studies by Joseph Weber in 1922, by F. N. Freeman in 1924; the classification and cataloging studies by A. P. Hollis in 1924 and 1926; the extensive, controlled experiment in twelve city school

systems by Ben Wood and F. N. Freeman; the twelve investigations in "The Motion Pictures and Youth" series done under the direction of W. W. Charters; those by a number of commercial firms interested in the making or distribution of educational films, machines, or materials; the reports of the N.E.A. Committees on Visual Education; the conferences held and the extensive investigations made under the auspices of the American Council on Education; and investigations by individuals, as those by F. D. McClusky, V. C. Arnspiger, L. H. Westfall, Fannie W. Dunn, C. M. Koon, M. R. Brunstetter, C. C. Peters, Helen C. Davis, C. F. Hoban, Jr., Edgar Dale, Etta Schneider, and others.

The use of radio as an aid to instruction in the school has been subjected to a large number of investigations in the few years of its rapid development. The U.S. Office of Education, the N.E.A., and the American Council on Education have been given large responsibilities in the development of plans for the wise use of radio in the schools.

Under the leadership of the Advisory Committee on Education by Radio, established in 1929, a program of research has been carried on that annually shows the use of radio in schools and calls attention to improved ways of using it. Many studies affecting educational practice are listed in the yearbooks of the Institute for Education by Radio and the assemblies of the National Advisory Council on Radio in Education. A few of the pioneering adventurers in the use of the radio in education whose services and teaching have contributed directly to the education of teachers in the use of radio are W. W. Charters, Levering Tyson, Josephine H. MacLatchy, W. C. Bagley, Helen Johnson, C. M. Koon, Fannie W. Dunn, Margaret Harrison, A. L. Eisenberg, F. H. Lumley, Hadley Cantril, G. W. Allport, R. L. Cortright, F. N. Stanton, and T. F. Tyler and I. K. Tyler.

(6) Attempts to Rate or Measure Teachers. Studies attempting to rate teachers have resulted in the development of various devices, most of which have followed in general the procedure used by A. C. Boyce in the *Fourteenth Yearbook, Part II*, 1918, of this Society.

In 1927 C. L. Jacobs analyzed the content and form of the rating cards from forty-three cities and prepared a rating card composed of the most frequently used items appropriately described and weighted as to importance in establishing a single index of the teacher's rated effectiveness. Harold Rugg's study in 1921 on the accuracy with which a person can be rated on a five-point 'man-to-man' scale did much to prevent over-refined classification. Studies by Charters and Waples,

Whit Brogan, W. H. Burton, A. L. Odenweller, F. W. Hart, and others have listed the characteristics of teachers considered desirable by superintendents and employing agencies.

To the extent that the generally approved characteristics of teachers involve or are affected by the teacher's actual work with the children, these studies contribute to the work of the practice schools in which attempts are made to develop or strengthen such desired characteristics.

3. Increased Attention to Selection and Guidance of Prospective Teachers

The studies in this large field fall into four principal subdivisions.

a. The Study of Supply and Demand Relationships. Analyses of the factors involved and of the variables to be controlled in keeping an adjustment between the supply-and-demand factors are presented in Volumes II and VI of the N.S.E.T. and in earlier studies made by B. R. Buckingham, A. F. Myers, Frank H. Hubbard, E. T. Peterson, E. F. Lindquist, E. W. Anderson, J. A. Blackburn, I. O. Foster, R. R. Foster, M. R. Trabue, W. C. Bagley, Mary Elliff, A. V. Overn, Evelyn A. Clement, J. G. Umstattd, Henry Klonower, F. H. Whitney, and many others. In general, these studies have shown (1) that there is an oversupply of teachers holding valid certificates but an inadequate supply of teachers with the approved amount and kind of professional preparation, (2) that it is difficult with existing records to estimate the number of unemployed or available teachers, and (3) that it has been considered 'impossible' to control the supply, though several states have introduced various modifications of the 'quota system' of regulating the supply while others are experimenting with more detailed certification requirements and with restricted certification. These findings bear directly upon the standards of admission to curricula for teachers and upon the curricular pattern followed by those desiring certification in any specific state.

b. Improved Methods of Selective Admission. Any attempt to reduce the supply of teachers by eliminating them from the training institution after admission again emphasizes the evident need for valid and reliable measures of teaching success.

One of the first attempts to find measures predictive of teaching success was the analysis made by G. T. Somers, in which he found positive correlations between a number of measures and such criteria as success in practice teaching, success in the normal school, and success in teach-

ing in the field. Other studies with the same general purpose include those by H. L. Kriner, Elizabeth H. Morris, M. E. Townsend, F. H. Whitney, A. L. Odenweller, H. R. Taylor, H. H. Remmers, and R. R. Ullman. These have all shown that predictions based upon several measures have higher correlations with the criteria used than any one of the measures used singly, and they have all failed to provide evidence in favor of any measure or set of measures that is impressive enough to effect a widespread reform in the methods of selecting prospective teachers.

Another group of studies in this field has attempted to discover the causes of failures in college and in the preservice preparation for teaching and, where possible, the value of certain measures in predicting success or failure in college work. A number of individual institutions have made 'mortality' studies of their own student bodies, and organizations such as the College Entrance Board and the American Council on Education have analyzed the result of the different tests used. One of the most comprehensive of the studies of a college's plan of admission is the report made by Ben Wood in 1923 on the use of new-type examinations in Columbia College. They proved more reliable than any other available measure. Outstanding is also the series of analytical reports of the Scholastic Aptitude Tests, made by Carl Brigham, of Princeton.

Other comprehensive studies on this topic are those included in the *Seventeenth* and the *Twenty-First Yearbooks* of this Society, the series of reports of the Coöperative Testing Program of the Teachers College Personnel Association under the direction of J. D. Heilman, the findings of the Carnegie Foundation study of the relations of secondary and higher education in Pennsylvania, directed by W. S. Learned and Ben Wood, and O. E. Hertzberg's reports on the program of the New York State teacher-training institutions to improve their product by better selection. D. H. Gardner's report on "Student Personnel Services" in the *Evaluation of Higher Education* series of the North Central Association assembles the conclusions from a number of special reports on this topic and proposes, as have the other studies, the use of as many measures as can conveniently be obtained.

Other surveys of the admission practices in teachers colleges have been made by Clarence Linton, Mellicent McNeil, and M. E. Townsend; in liberal-arts colleges by H. A. Kurani; in all higher educational

institutions by P. R. Brammel (National Survey of Secondary Education), and by J. W. Jones.

Another type of study has compared students who select teaching as a career with those who elect to enter other fields of work. The Carnegie Pennsylvania study has supplied data from the large group of colleges and teachers colleges in that state. The coöperative studies directed by Heilman have made possible, over a period of several years, comparisons between representative groups of students from teachers colleges and from liberal-arts colleges. Margaret Kiely's study made similar comparisons on a battery of tests designed to test information, judgment, and professional attitudes. Tressa C. Yeager compared a group of high-school seniors who expect to enter teaching with those who expect to enter other fields, on such items as scholarship, leadership, personality, and economic background. With certain exceptions in the two last-named studies, the comparisons all indicate that teaching is attracting proportionately fewer of the abler students than are other comparable occupations.

Other studies related to the problems of admissions and to success in college are being sponsored by the Progressive Education Association and carried out under the direction of W. M. Aiken, R. W. Tyler, Carolyn Zachry, and others.

c. Increased Attention to Educational and Social Guidance. Since 'guidance' is to be treated in another chapter as well as in Part I of the current yearbook, reference will be made here to only a few of the studies that bear most directly on the education of teachers. The Commonwealth Teacher-Training Study, by Charters and Waples; the various state surveys of the education of teachers; and such studies as those by M'Ledge Moffett, M. E. Townsend, Part III in Vol. V of the N.S.E.T. by B. W. Frazier and W. J. Greenleaf, and the appropriate chapters of D. H. Gardner's report for the North Central Association have all supplied factual material upon which to base recommendations for teachers in the field of guidance. The survey now being conducted by the Division of School Studies of the National Committee for Mental Hygiene to determine how much attention is being given to problems of mental health in the preparation of teachers has revealed very important unmet needs both in the development of well-integrated and emotionally balanced teachers and in the preparation of these teachers to recognize and to handle the simpler personality problems of their pupils.

d. *Improved Plans for Placement and Follow-Up.* Providing part-time work for needy students, placing them in the positions for which they are best prepared and suited, and helping them successfully to make the needed adjustments during the first year or two of teaching are now generally considered parts of the guidance program of a professional school for teachers. Some of the studies that have helped to support such a program are those by Whit Brogan, J. S. Schultz, J. G. Umstattd, M. E. Townsend, W. H. Adams, D. H. Gardner, E. C. Higbie, Effie Bathhurst, and N. Conger.

Many institutions have worked out their own plans for providing this adjustment service; for example, the 'Westfield Plan,' developed by Charles Russell, in which members of the senior class exchange places for a week with appropriate members of the last year's graduating class who are employed in the area served.

4. Increased Use of Education of Teachers in Service

As previously indicated the period of preservice education of teachers has been materially lengthened, though it is not yet long enough. The only practicable solution at present is to continue the professional preparation during service, postponing those phases of the preparation that can be most easily acquired while the teacher is employed.

W. C. Ruediger's report on *Agencies for the Improvement of Teachers in Service* published by the U.S. Bur. of Ed. in 1911, Charles Russell's classification of the various methods of inservice education in 1922, F. H. Whitney's questionnaire study in 1927, and the study made for the N.S.E.T. under the direction of N. H. Dearborn (Part VI of Vol. V) have assisted in the extensive development during this period of a large variety of methods for the education of teachers in service.

Studies especially of summer-school problems and policies include those by J. E. Avent, F. K. Foster (Part V, Vol. III, N.S.E.T.) and the statistics on summer-school enrollments prepared by Raymond Walters and by the Research Division of the N.E.A.

Extension and correspondence courses for teachers are now being widely used by some institutions of higher education. Such courses have enabled many to meet higher requirements while they continue teaching. Among studies bearing on this type of preparation may be mentioned those published by the U.S. Bur. of Ed. (or more recently by the U.S. Office of Ed.) and prepared by L. E. Reber, W. S. Bittner, A. J. Klein, and L. R. Alderman; those made for the Carnegie Corporation

by O. D. Evans, A. L. Hall-Quest, J. S. Noffsinger, and N. Pepper; the survey made for the Committee on Standards and Surveys of the American Association of Teachers Colleges in 1930; and studies by R. E. Crump, F. W. Cyr, R. C. Maul, D. W. Emerson, W. S. Bloom, and H. F. Mallory.

5. Higher Standards of Preparation of Staff Members in Institutions for the Education of Teachers

The selection of the studies to be referred to in this section is difficult because of their number and the overlapping of this discussion with that of higher education in another chapter. The N.S.E.T. showed very clearly that most institutions of higher education in the United States are in effect institutions for the preparation of teachers. The studies listed here are, however, those aimed most directly at the staffs of the normal schools and teachers colleges. They are presented under three topics.

a. Better Scholarship. For a number of reasons, the standard of academic qualifications for staff members has not been so high as that for colleges and universities. Bagley in the N.E.A. Proceedings of 1915, and Judd and Parker in 1916 in their report on Problems Involved in Standardizing State Normal Schools (Bulletin U.S. Bur. of Ed., No. 12, 1916) called attention forcibly to this matter. Those reports, emphasized as they were by the data and recommendations of the Missouri Survey by Learned and Bagley and by the activities of the various regional accrediting agencies, encouraged the American Association of Teachers Colleges, through its Committee on Standards and Surveys, to raise the academic requirements of all staff members in normal schools and teachers colleges. The annual reports of the standards and accrediting committees of the American Association of Teachers Colleges, supplemented by studies by Shelton Phelps and Harris M. Cook and by the findings of the N.S.E.T. (Vol. II, Part III), have stimulated a more rapid and more extensive improvement in the academic preparation of faculty members than has occurred in any other group of institutions—an average increase of nearly a year and a half of academic training, most of it graduate work, in a period of less than ten years.

b. Increased Concern of Faculty Members over Professional Responsibilities. The presidents of the normal schools and teachers colleges, through the work of committees of the American Association of Teachers Colleges, have been endeavoring to retain and develop the dis-

tinctly professional elements in the preparation of teachers in addition to raising the academic preparation of the staff members. Their efforts to develop collegiate-grade professional schools have been aided by (1) a number of the surveys of higher education and teacher-education; (2) several separate studies, such as those by P. G. Chandler on *Some Methods of Teaching in Six Representative State Teachers Colleges* and A. Linscheid on *In-service Improvement of the State Teachers College Faculty*; (3) a series of studies on the professional treatment of subject-matter courses for teachers by E. D. Randolph, E. A. Cross, W. L. Schaaf, Florence G. Billig, L. R. Meadows, E. A. Bond, A. E. Robinson, and others; (4) the studies previously referred to dealing with the activities of the practice or laboratory schools and with the placement and follow-up of graduates; (5) scientific studies reported in the yearbooks of the Eastern States Association of Professional Schools for Teachers; (6) studies in the yearbooks of the International Institute of Teachers College; and (7) a series of studies of the administration of normal schools and teachers colleges, especially of the professional duties and responsibilities of the administrative officers and the faculty members, by W. D. Agnew, S. A. Rutledge, C. C. Sherrod, F. B. O'Rear, H. J. McGinnis, R. H. Morrison, and C. B. Collier.

In the light of the present policy of the North Central Association to accredit institutions in terms of their professional purposes, the comprehensive report by M. E. Haggerty on the faculties will have increasing influence in directing attention to the professional phases of an instructor's work in institutions educating teachers.

Many of the professional elements in the work of staff members of institutions preparing teachers are analyzed and discussed in the report of the N.S.E.T. (Vol. III), prepared by E. Rugg and W. E. Peik, and also in the third chapter of the summary volume.

c. Improved Conditions under Which Faculty Members Work. Salaries of staff members of normal schools and teachers colleges have been raised as a result of the studies of the Carnegie Foundation, of the N.E.A. Research Division, of Trevor Arnett, of the Survey of the Land Grant Colleges, of the N.S.E.T., and of the periodic reports of the U.S. Office of Ed.

The service and teaching loads have been reduced and equalized as a result of such investigations as those by L. V. Koos, L. B. McMullen, H. L. Donovan, H. J. Magee, and of the service-load analysis made in the N.S.E.T. (Vol. II, Part III).

Sabbatical absences, while still available in only about one fourth of the normal schools and teachers colleges, have been made more popular by the drives to add to the amount of educational preparation of faculty members and by the outcomes of such studies as the Land Grant Survey, the N.S.E.T., the North Central Study of Standards, and reports by the N.E.A.

In the same way and as a result of the studies by the same organizations and those of the Carnegie Foundation and the American Association of University Professors, tenure is more nearly secure, provision for some form of retirement allowance is more common, academic freedom is more generally enjoyed, and there is more participation of faculty members in the determination of institutional policies.

6. Increased Adaptability and Efficiency of Physical Plants

This topic is treated more fully in other chapters of this volume. Many of the improvements in the educational usability of public-school buildings that resulted from studies like those by F. B. Dressler, G. D. Strayer, N. L. Engelhardt, and others have been emphasized during the past fifteen years for the physical plants of institutions of higher education by C. Z. Klauder, H. C. Wise, J. F. Larsen, and A. M. Palmer. Other contributions to this field have been made in surveys of normal schools and colleges, by F. W. Reeves and by the writer, and in the preparation and use of standards for college buildings.

The development and acceptance of standards for units of the physical plant, such as the library, the health and physical education buildings, dormitories and recreational halls, have been accelerated by studies made by W. M. Randall, G. W. Rosenlof, Douglas Waples, L. F. Fargo, L. R. Wilson, committees of the American Library Association, Harriet Hayes, Mary D. Bryan, committees of the American Association of University Women, committees of the White House Conference on Child Health and Protection, and others.

7. Development of Graduate Departments for the Study of the Professional Preparation of Teachers

The first of these departments was started in 1917 at Teachers College, Columbia University, by W. C. Bagley. Since that time, other universities have established similar departments, while yet others have organized one or more courses dealing specifically with the problems of educating teachers. These departments have sponsored surveys and, in

connection with work for advanced degrees, have encouraged researches that have aroused interest in the professional education of teachers and stimulated many of the investigations previously listed in this chapter.

8. Development of New Attitudes toward Change

Certain studies have been concerned with the development in teachers of desirable attitudes toward newer or different forms of educational, social, and economic organization. As long as a diversity of practice exists in the area served by a teachers college, it cannot prepare each teacher equally well for all types of schools. It must select the predominant type and prepare teachers for it, but it should at least acquaint the prospective teacher with the advantages and disadvantages of other types and the relation that each type bears to prevailing philosophies of education.

There has been an increasing willingness on the part of institutions of higher education to experiment with different methods of preparing teachers. One of the earlier experiments in this period and also one of the most influential in its effect on practice was the increased emphasis put upon practice teaching and individualized instruction in the San Francisco Normal School under the leadership of Frederick Burk. Among other teachers colleges in which different plans for the education of teachers have been tried may be mentioned those at Greeley, Cedar Falls, Albany, Milwaukee, Towson, Montclair, New College of Teachers College, Columbia University, and those in several states in which the curricula for teachers have been changed, as in New York, Pennsylvania, Massachusetts, Connecticut, and California.

Studies made by Manly Harper, R. B. Raup, Margaret Kiely, O. J. Williamson, F. E. Peterson, H. K. Beale, Douglas Waples, and G. W. Hartmann have all shown that teachers and prospective teachers are not so well informed on questions of social, economic, and political changes as society has a right to expect from the teachers of its children.

IV. CONCLUSION

Filled as the period has been with changes, and certain as it is that the years ahead will have more, it becomes a peculiar responsibility of institutions in which teachers are receiving their preparation to organize curricular materials and arrange for those educative experiences that will best equip teachers to become real leaders in the gradual, peaceful, progressive improvement of the best elements in the American

democratic systems—educational, social, political, and economic. This is clearly one of the fields in which a minimum of research has been undertaken, but to which, in spite of the obvious difficulties, much more attention should be given.

Finally, an explanatory caution should be expressed: ‘research,’ even as broadly defined, has been very generously imputed to some of the studies mentioned in this chapter; on the other hand, it is probable that there have been omitted many studies that are better examples of research and that have exerted greater influence on the education of teachers than many that have been included.

CHAPTER IV

CONTRIBUTIONS OF RESEARCH TO THE CURRICULUM¹

I

A GENERATION OF RESEARCH ON THE CURRICULUM

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When the scientific movement began seriously in education, the curriculum offered a virgin field for research. Such tangible elements as minimal essentials, credits, topics, problems, projects, units, time allotments, grade placements, the materials of instruction, and certain measurable results of instruction assured the objective data that research required. Confidence in the superiority of a curriculum based upon facts as to the where, why, what, and how of education over practices resulting from speculation, haphazard impression, and unchallenged experience motivated a search for specifics. This initial investigation was necessarily confined to the limited areas easiest to explore.

I. THE SETTING FOR THE CURRICULUM-RESEARCH MOVEMENT

The dissatisfactions felt by outstanding educators thirty or forty years ago prepared the background for curriculum research. In Part I of the *Twenty-Sixth Yearbook* of the Society Rugg has pictured a century of curriculum development, so that only its principal features as they existed a generation ago need be reviewed here.

The curriculum had acquired an aloofness from practical life through the long association of education with religion. The supposed disciplinary effect of subjects made transfer value and individual culture, rather than social usefulness, basic criteria for selection of instruc-

¹ Circumstances prevented the carrying out of an earlier plan for a joint chapter on the curriculum. Happily the two contributions finally received, despite some slight overlapping, have stressed different aspects of the situation; accordingly, they are both presented in full as Sections I and II of Chapter IV.—*Editor.*

tional content. The strong intellectual emphasis in education combined with the lack of preparation of teachers to keep instruction verbal and 'book bound,' removed from the activities of life itself.

But even then education was not totally oblivious to temporal, practical, or social values, which had been in gradual ascendancy throughout the nineteenth century. The Industrial Revolution, the development of democratic ideas, the increase of knowledge, and changes in educational theory influenced the character of an expanding program of elementary and secondary studies; but the transition was slow, tardy, and inadequate. Generally sensed needs or the social pressure of minority groups succeeded in extending the school program of the three R's in the elementary school and the classical courses of the secondary school to include geography, history, hygiene, civics, English, nature study, literature, art, music, home economics, and industrial arts. Having found a place in higher education, the content of social studies and of science, too, filtered down into the secondary and elementary schools to enrich the programs.

Education was still not quickly sensitive to social needs or changing conditions. The teachers themselves often resisted the introduction of new subjects or, after they were accepted, refracted the social aims to accord with the concepts of mental discipline. The ordinary curriculum, enlarged and overcrowded with additional subjects, still remained verbal, formal, inflexible, and limited.

Leaders of the first magnitude, such men as Eliot, Parker, Harper, Dewey, Harris, and Burke, then came to challenge these conditions, advocating expansion of the curriculum, elective privileges for students, enrichment of subjects, adjustment to individual differences, new emphasis upon social studies and science, and the child-life standard. Their attitude of inquiry and departure from the complacent acceptance of past and current practices, together with their familiarity with the newly developing child psychology of Wundt, James, Hall, and their students, initiated a spirit of challenge and criticism in education at the close of the last century. This point of view matured into more formal scientific study under a later generation of educators that included Thorndike, Judd, Courtis, Whipple, Coffman, Horn, Freeman, Haggerty, and a host of others.

But still the inherent resistance of an inadequately educated profession and the inertia of practices established over long periods of time retarded necessary change. As students, when exposed briefly to a newly

developing field of education, teachers often accepted declarations of theory, but as teachers and administrators, when on the job, they easily succumbed to the practices of their childhood. Lack of induction into better teaching practices after graduation, properly supervised by informed leaders or master teachers, permitted this contradictory state of affairs and does so still. The growing influence of newly organized summer schools did begin to promote the break with tradition, but only partially filled the gap between the curriculum and social need and, likewise, that between the curriculum and the development of the learner. By acquainting experienced teachers with the ideas of the new leaders, summer sessions encouraged them to put these theories into practice. By offering continuation of professional study, summer sessions, institutes, and reading circles did help to remove in part a powerful obstacle to progress, but they in themselves were not sufficient truly to correlate the schools with life even in theory, let alone in practice.

The authority of educational committees and of college entrance boards, at first selected largely from private schools and institutions of higher learning, had become influential during the nineties in shaping curriculums and represented an advance over preceding complacency. They initiated certain reorganizations and improvements but adhered to established trends. Slowly a wider opposition came to demand release from college domination, the recognition of child nature, and acceptance of social and personal usefulness as standards for evaluation of the curriculum.

The new interest in the scientific study of curriculum problems resulted in the development and establishment of new and different criteria for the selection and organization of subject matter. The culture-epoch theory, for example, greatly elaborated in the first yearbooks of the National Herbart Society, was an offshoot of the concept of evolution, then the subject of intensive investigation in the biological sciences. Teachers were concerned with such new topics as the interest and sequence of subject matter, the shortcomings of mental discipline, and the correlation, coördination, and concentration of studies.

The very first publication of the National Herbart Society² showed this readiness for reorganization in DeGarmo's introduction: "One of the problems that has forced itself upon us is, therefore, what shall the

² The Herbart Society for the Scientific Study of Teaching. *The First Yearbook*, pp. 3-26.

public schools teach?" In later chapters it is exhibited in such expressions as "surgical pedagogy," "substitutions of geography and history as instructional disciplines . . . for grammar and mathematics" . . . "the mental food so palatable to gentlemen and literati and so valuable for professionals has proved to be neither palatable nor valuable to many of the sons of toil to whom the educational traditions are like mythological tales."

Occasional reference to a "science of education" in the early publications of those days showed their desire to be scientific.³ Their increasing reference to Herbart, Wundt, James, Hall, Binet, and others who applied psychology to educational problems, indicated a development and a recognition of educational psychology as a basic educational science, though with more emphasis upon the method than upon the content of the curriculum. The culture-epoch theory itself attempted to psychologize the curriculum scientifically, in accord with the alleged stages of child development. Eventually, of course, in more informed educational circles the culture-epoch theory was challenged and discarded as knowledge of biology and child psychology increased.

The desire for a more scientific basis for the curriculum was demonstrated in the first fifteen yearbooks of the Herbart Society and this Society from 1895 on; they included yearbooks on history, geography, nature study, teacher training, industrial arts, agriculture, English, kindergarten, supervision, and sex education. Although these publications did not present objective research on the curriculum, they did reveal a growing spirit of inquiry and challenge.

Interest in health, industrial, and agricultural education developed during 1910-14, reflecting a more utilitarian viewpoint, but without research in those fields. Committee recommendations and innovations were, however, subjected to critical discussion. Improvement of administration and supervision was the chief object of the new and more objective research when it emerged at about that time.

II. THE NATURE OF THE NEW CURRICULUM-RESEARCH MOVEMENT

1. The Tests and Measurement Movement

The first evidence of the coming more widespread relation of research to the curriculum itself appeared in the *Twelfth Yearbook of*

³ The aim, method, and content of the early yearbooks are treated more fully in Chapter XXI of this volume.—*Editor*.

this Society in 1913 when Courtis's Standard Tests were advocated for use in city schools. Likewise various tests developed by Thorndike, Ayres, Freeman, Stone, and Wilson were mentioned or briefly described. Although the testing movement had been launched by Rice in the middle nineties, it was Dr. Thorndike and his students, who, with the use of statistical procedures he had adapted from other fields, really inaugurated measurement with the presentation of his Handwriting Scale in 1908. The Stone Arithmetic Tests were published about that time.

The test and measurement movement then expanded rapidly into almost every field. In 1910 tests were first used in a school survey to evaluate instruction in New York City. Soon research bureaus were established in New York, Boston, Detroit, Kansas City, Minneapolis, and Oakland, to rate instruction by means of standardized measurements.

2. The Quest for Minimal Essentials and Social Utility

A quest for minimal essentials followed close upon the heels of the testing movement and the city school surveys. As leaders gradually abandoned the doctrine of mental discipline, failing to find scientific support for it, they placed greater emphasis upon social utility as a basis for identifying these essentials. Recommendations for the elimination of the relatively useless, as determined by repeated investigation, aimed to effect economies in an overcrowded curriculum, while the advocated addition of more practical content, as discovered by the same means, aimed to provide needed vitalization of instruction.

The five-year period from 1915-19 revealed a new interest in curriculum problems, as shown particularly in four volumes reporting the findings of the Committee on Economy of Time in Education, and two volumes on tests and measurements, all published by this Society. Minimal essentials were again revealed as the specific objectives of research in four later yearbooks of the Department of Superintendence published from 1925 through 1928. By that time administrators and teachers had created a demand for abstracts and résumés of the studies that had become so numerous.

Indeed, the published research was so extensive that it soon became necessary to devote entire volumes of research reports to a single subject, as in Gray's *Summary of Investigations Relating to Reading*, which was the pioneer.

3. Stress upon Individual Differences and Remedial Instruction

The natural outgrowth of an increasing use of mental and achievement tests in the schools and by research workers was a greater emphasis upon the individual differences revealed by the tests and the adaptation of instruction to them. During the early twenties two yearbooks revealed this trend in research, as did a third in 1925. Acceleration, enrichment, individualized instruction, differential assignment, and grouping, not altogether unknown to education, were tried increasingly in somewhat experimental adjustments; the cumulative results were occasionally summarized in the literature. Many investigations followed that involved diagnosis and remedial teaching, which still present an active field for research; they began largely with arithmetic and reading and then spread to most other subjects.

4. Demand for New Materials of Instruction

The new concepts and insights developed through investigation also created a demand for more appropriate materials of instruction conceived along the lines indicated by the data secured on minimal essentials, grade standards, diagnosis, and individual differences, and aimed to meet explored interests, needs, and varying abilities of children, which had been objectives of research for several decades. The content, treatment, illustration, and general makeup of tests, reference books, and, later, workbooks reflected the findings in the investigation of children's native and acquired interests.

In 1920 and 1921 the yearbooks of this society on "New Materials of Instruction" bore witness to this growing interest in better instructional materials. A special volume on textbooks appeared in 1931. Texts in spelling, English, arithmetic, social studies, and reading published since 1925 were improved by their greater use of the recommendations of research workers based upon data accumulated in their work; such changes were particularly noticeable in reading.

Thus the first generation of curriculum research, attempting a scientific approach, developed more standardized instruments for testing outcomes of fact, skill, and, to some extent, generalization and insights; sought minimal essentials to constitute a curriculum core based upon social importance or use in life; extended knowledge of the range of individual differences through innovation and experimentation, with adaptation of instruction to the individual; produced diagnostic and

remedial procedures; explored child nature further; and prepared better materials of instruction.

At present research pertaining to the curriculum continues in all these fields, with, in addition, attempts to study objectively the more intangible outcomes of instruction through the development of new tests and measurements of attitudes, appreciations, ideals, creative ability, and the ability to apply educational background to new problems. Although some progress has been made in these more intangible areas, the results thus far are not sufficiently reliable and valid to furnish in themselves a basis for much instructional reorganization.

III. THE METHODS OF THE CURRICULUM-RESEARCH MOVEMENT

The research procedure of the last thirty years to ascertain the objectives, content, and organization of the curriculum may be classified into eight general types. The procedure has used methods of analysis more often than methods of synthesis or experimentation, and the studies have been typically piecemeal, short period, and local, rather than of wide scope over long periods of time.

1. Psychological Analysis of the Learner

The behavior of childhood and youth as a growing, maturing organism was studied as a guide to the content and method of instruction appropriate to each age level. It constituted much of the earliest educational research. Attempts to ascertain and define the characteristics of the assumed stages of development, the dominant interests, the natural activities, and the extent of individual variations sought to enable teachers to understand the learner better. Both case and group methods of child study were employed as a basic approach to the adaptation of the curriculum to the nature of the learner. As a result, more is known now than formerly, although for some time the measurement movement eclipsed that of child study, which is recently emerging again for more attention.

2. Educational Analysis of the Accomplishment of the Learner

The reaction of the growing child to his total environment, including formal education, results in more or less characteristic learnings and developments as well as in deficiencies. A knowledge of the specific lines of development facilitates choice of educational procedures and content. At successive periods of growth it is necessary to make studies of general, regional, or local groups and of special groups to ascertain

the characteristics, shortages, difficulties or problems, common achievement, or crucial needs peculiar to each. Age and grade norms for groups were based largely on current types of instruction. Determination of errors oftenest repeated in English usage and spelling, and of mathematical and reading difficulties, illustrates the wide range of analytic study that utilized not only tests but also observation and questionnaires.

3. Analysis of Social Need

The study of society and its institutions may reveal the content and method in education that should result in social progress. Social statistics gained through direct study of current trends, as well as analysis of books and periodical literature, have therefore been chief sources of information. Useful inquiries were derived from the sciences basic to education itself, such as sociology, economics, and political science. A special form of social study is job analysis, which aims to ascertain by means of observation, interview, memory lists, performance, practice, or questionnaire just what activities were involved in certain work and just what traits were desirable for its performance. Instruction was then planned to foster these needed traits and activities. This type of investigation has recently received greater emphasis.

4. Composite Judgment of Most Competent Groups

Appeals have been made to authoritative judgment through questionnaire or interview on issues related to instruction. A knowledge of the trend of the group thinking in the area to be studied was indispensable, whether the thinking was that of experts or of ordinary members of the group educated in the field.

5. Experimentation

The value of innovation in experimental groups was determined by initial and final measurements of status. This method of evaluation through tests depends upon the reliability and validity of the instruments of measurement. Whereas testing is scientific in theory, and experimentation is a basic approach to curricular development, this type of research is still limited in value through a lack of instruments that are wholly valid and sufficiently refined. In some important sectors tests of outcomes are yet either lacking or in a very crude state of development. Suitable tests are essential to the progress of research through measurement. The first tests have aimed largely at evaluation of specific achievement. They do not as yet reveal the integrated

growth of the learner in all his fields of acquisition. Progress made thus far is encouraging; much more effort needs to be expended on this approach, which is a fundamental one.

6. The Historical Method

Tracing the origins and development of present curricular practices and problems and studying their status at particular periods have thrown much helpful light upon curricular issues and trends.

7. Survey of Current Practices and Policies

An accurate survey of current conditions is an important pre-requisite to intelligent change in the curriculum. Innumerable studies of time allotments, requirements, grade placements of topics, units, and credits have been made through analyses of bulletins, courses of study, texts, permanent record cards, and examinations. Statistical procedures, observation, and questionnaires are used on a large scale to attain a survey of specific subjects, courses of study, and instructional activities. This is the most common type of curriculum investigation. It has led to a better understanding of our situation.

8. Integration

Combining the data from all types of research, selecting the good, eliminating the poor, and evaluating the sometimes contradictory findings in terms of criteria or values is a service rendered by summaries and interpretations of investigations in education and also in sciences like sociology, biology, psychology, political science, and economics that are basic to education. A large volume of available, but undigested, research awaits this treatment of evaluation according to assumed values and criteria.

IV. AN APPRAISAL OF THE CURRICULUM-RESEARCH MOVEMENT

True evaluation of the movement so far is not yet possible, owing to the recency of its inception, its mass of detail, and its varied character. Only a later generation can view the projects of this one in proper perspective.

1. The Quantity and Quality of the Research

One fact appears certain: curriculum research is still gaining momentum. Whitney⁴ found that about one-third of all educational research in 1934-35 pertained to the curriculum. The number of projects

⁴F. L. Whitney. *The Elements of Research*. P. 105. (Prentice Hall, Inc.: New York, 1937)

that year was 1,208. The number of studies reviewed for successive three-year periods by the *Review of Educational Research* has been 303, 889, and 1,901, respectively. Within recent years it has extended into higher education, so that over one hundred objective investigations are appearing annually in the literature, in addition to those graduate studies and investigations of research committees that are never published. This growth in scope and number reveals a persisting faith in the movement of curriculum research.

Most of these investigations have been local and devoted to a great variety of problems. Some possess much merit; some, little; and many, none when evaluated for accuracy, completeness, reliability, or validity.

Progress has been made in defining and clarifying the present, but not in sensitizing education to what it ought to do. Thus research has revealed much better what is taught and is learned for present situations than what can be done to improve conditions.

A generation of research has made valuable contributions in eliminating the deadwood of traditional texts and courses. Selection of new content, new materials of instructions, and new activities has emphasized enrichment, social use, and social progress.

The faulty techniques of early studies on minimal essentials, shortages, and difficulties are being improved in accuracy, completeness, objectivity, and valid quantitative methods. Minimal essentials, now more clearly defined at the elementary-school level, are supplanting authors' personal opinions. The minimal essentials of elementary instruction are no doubt more closely identified with social use and need than they were when the individual judgment of textbook writers, imitation of current practices, and the standard of mental discipline determined content. The same improvement has taken place in courses of study over a period of twenty-five years.

Now, later research in repeated studies more often confirms the conclusions of earlier research and gives promise of ultimate findings that are valid. This is shown in the periodical summaries of investigations in reading, spelling, arithmetic, English, shortages, persistent social problems, and children's interests.

2. Some Specific Contributions of the Research

The specific contributions of research can be illustrated in a few disciplines.⁵

⁵ For further treatment of the three contributions here cited as illustrations, see Chapters VIII, VII, and VI, respectively.—*Editor*.

a. Spelling. In spelling, for example, the words most important with reference to frequency of use are fairly well defined. It is believed that not more than about 3,000 words can be taught by current methods in the six grades as now constituted. More is known about optimal time allotment than formerly. Not nearly all the words a person will spell can be taught him in school, and these words vary considerably with individuals. Progress has been made on the problems of grade placement. The former wide disagreement in the basic vocabularies of spellers and the inclusion of too many little-used words has been revealed and adjusted. No doubt spelling texts and spelling instruction have been improved, although research still has much to explore in that area.

b. Reading. In reading, likewise, research has been responsible for much improvement of content and method. The former overemphasis on oral reading was discarded in alert schools when evidence revealed its infrequent use in daily living, its retarding effect on rate of reading, and its interference with accurate comprehension and effective learning as compared with silent reading. Experimentation has proved the value of intensive education in specific reading abilities, facilitated by diagnosis and remedial instruction. Children's reading interests, the words most commonly needed in early reading, and the nature of reading ability are much better known now than twenty years ago. A better knowledge of the nature of growth in general reading ability has resulted in enrichment of content and in greater volume of easier reading. Great improvement has been made in the vocabulary, the illustrations, the appeal, the physical features, and the range of content in the materials of reading instruction. The life uses of reading have been brought into the daily program as the result of research.

c. Arithmetic. Many studies in arithmetic have produced more accurate knowledge on this subject. It is deemed advisable to postpone the introduction of formal arithmetic and to delay grade placement of certain topics. The study of common, business uses of arithmetic has eliminated old irrelevancies and emphasized new aspects. Now most textbook writers and many teachers (but still too few) understand arithmetic processes better and make more use of the practical problems used in daily life. Some progress has been made in the distribution and the motivation of practice. The relation of intelligence to achievements in numbers and the range of individual abilities are better understood, and the differentiated standards are more widely used. Appre-

ciation of the social value of mathematics and the study of children's needs, interests, and abilities have resulted in useful reorganizations and in the improvement of texts and other materials of instruction.

If these and many other findings of research that have effected changes were acted upon universally, current instruction would be greatly improved.

3. Some More General Outcomes of the Research

However, some broader outcomes of the research movement are making as great or even greater contributions to education than the specific results.

Thus, a very definite result of curriculum research has been the stimulation of more critical attitudes on the part of a much larger proportion of those engaged in curriculum-making. Fewer leaders in education today accept practice just because it has been practice, although it will no doubt be a long time before every teacher can be a critic in his own right, truly professional as a creative worker, and an experimental teacher with a solid foundation in basic sciences to enhance his art and skill.

Another significant result of scientific effort is that the interpretation and evaluation of research have come to reconsider the basic functions of education in society and the objectives and outcomes of education in terms of social values and social progress. In this reversion, the positive contributions of research to the broader considerations underlying the curriculum have been significant. The effort to select content of specific social value has evolved broad social frames of reference. The attitude of hypothesis and evaluation has produced more reflective thinking of a type that might sometimes be isolated as philosophy, but which is as much a part of research as research is of true philosophy.⁶ Research is fact-finding to build a better basis for philosophy. It is to be kept in mind that many scholars who were once devoted to research, but who now affirm greater allegiance to philosophy as such, have become philosophical largely through the availability of newly discovered knowledge. Some educators have been so thoughtless as to claim retreat from the scientific point of view and seek refuge in philosophy only. They will find that there is no complete philosophy until there is complete knowledge; and they may well remember that to establish knowledge is the aim of research. The two are

⁶ The reader will find further treatment of this theme in the chapters of Section IV, "Science and Philosophy."—*Editor*.

phases of the same program of curriculum construction. More clarified thinking will produce better research on a higher level and on a larger scale with greater reliability and validity as it acquires further experience with improved techniques.

4. Long Continued Research Is Essential to Success

Problems of the curriculum cannot be solved in one generation of research effort. Centuries of mature research in astronomy, medicine, chemistry, and physics have left unsolved basic problems that may never be solved. But, after all, it is such long-time systematic investigation that has transformed alchemy into chemistry, quackery into medicine, and astrology into astronomy. This is a sobering thought, compelling acceptance of slower progress in the science of education accomplished by patient work faithfully performed. Only careful work can discriminate between actually inherent limitations of current methods and alleged limitations of research, which may be merely the shortcomings of insufficient development.

Almost all tests today are still very crude and not nearly so refined as they were first presumed to be. They have more reliability than validity; that has been deceiving. For example, several of the best reading ability tests purporting to ascertain the status of a pupil or of a grade in a similar general ability, such as rate, comprehension, or selection of central thought, will not agree so closely as they should in their placement of a specific typical class or group with reference to grade norms. They vary discouragingly at times, even to the extent of being several years apart in placing individuals and grade medians of achievement, although they correlate fairly high for entire grade groups. Therefore the public-school administrator must learn to use tests with reservation and careful interpretation rather than with the confidence in medians that was held ten years ago.

Least progress in curriculum research has been made with controlled experimentation that depends upon valid tests of measurement for evaluating significant outcomes. In theory it constitutes the ideal scientific procedure. The newer trends, such as the activity program, creative learning, incidental learning, integration, and the use of larger life units, need such experimental evaluation in terms of their own objectives. Subjective judgment on results obtained can never substitute for the refined results of systematic investigations, if such findings are possible; yet in some cases, today, subjective expert judgment, especially of informed committees, may be better than some tests, be-

cause it is integrated evaluation of a whole situation even though subjective, and it is not mere evaluation of one phase of learning, as most tests are.

Research today is based on too much uncritical acceptance of assumptions. The cure for prevalent difficulties is probably more and better use of scientific methods and the development of new techniques.

The need for long-range research in some fields does not obviate intensive use of techniques already fairly effective. To secure advance evidence of needs long before mere informal, incidental, or accidental observation makes the masses of the population or the rank and file of teachers aware of them is especially important in a changing society. Reliance upon what Courtis has called "common-sense observation," "biased views," and "uncritical acceptance of assumptions" has caused the present curriculum to lag behind the needs of American life. Current methods of investigation in society and in education, with all their crudities, can reduce the gap between social need and the curriculum. More intensive, systematic, objective attack on curricular problems by more institutions and by more teachers will accelerate sensitization of community schools to social needs and point the way to progress.

Recent criticism questions the efficacy of current scientific methods of ascertaining educational aims and values; psychological situations, it is alleged, cannot be measured by the same methods and the finite precisions of the physical world. This is no doubt true. The early research technique in the infancy of the movement was necessarily confined to limited areas and operated with imperfect procedures. As research matures, it may explore the more difficult intangible areas with perfected technique. Although the scientific method has begun with a study of the parts rather than of the whole and with specifics rather than values, the whole will not be overlooked, for the object of science is the integration of knowledge and the establishment of generalizations, insights, and principles that culminate in an integrated understanding based on complete knowledge. The first step, however, is analysis; then follows synthesis when situations are complex.

5. The Needed Forward Steps

The needed forward steps in scientific curriculum research will include, first of all, the perfection of techniques used to study single variables or the parts of whole instructional situations; but beyond this we shall have to perfect ways to measure all the outcomes of whole

instructional programs. Such measurements must be extended beyond the formal period of education to study the emergence, in life, of educational outcomes. Situations for integrated measurement should be set up to incorporate all those elements of practice and policy that research has already indicated to be of more value than others and to use likewise the best conclusions of a philosophy built upon those assumed values that have the most valid bases for acceptance. The outcomes of these more ideally planned programs of education should be studied again and again over a long period of time; the tests should be functional examinations of all learnings, rather than of only parts of them, and of so-called 'intangibles' as well as of tangibles. They should be related to the purposes that are fundamental to education. This stage of measurement for curriculum research has not yet been realized, but the beginnings are evolving. The integrating action of the mind in subjective judgments by thinking individuals who are helped with isolated tests is the only recourse we have thus far for curriculum evaluation.

Efforts may have to be confined largely to analysis and specifics for some time to come; such tests will always be used; but ultimately the outcomes of curricula will not be scientifically evaluated both validly and completely until whole situations can be studied for the scope, balance, and permanency of all outcomes in which shortages here may be compensated by gains there. This will require an enormous advance beyond the present stage of development of curriculum research.

We are, then, only in the pioneer stage of larger developments that lie ahead, in which the many problems that perplex us may not be solved for yet another generation, in which new problems will also be emerging continually.

II

RESEARCH AND THE PUBLIC-SCHOOL CURRICULUM

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and

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A reading of the chapters of the yearbook will show that the consensus of contributors is that the past decade has witnessed great ad-

vance in research in various areas of education. It would be pleasant indeed to be able to report equal or even greater progress in the extent to which such research is used by public schools. The writers of this section of Chapter IV have had neither the time nor the facilities to make either an original study of the extent to which the findings of research are utilized by public schools or even a complete survey of existing studies of this nature. However, the data available to us convince us that the gap between our knowledge and our curriculum practice is very great. In our opinion the generalization of Lee M. Thurston describes rather accurately the situation in which we find ourselves.

It happens, however, that teaching practice has not made full use of the contributions of the laboratory. Many first-class periodicals deal primarily with educational research, and occasionally an excellent book comes from the press; nevertheless most of the million teachers in the United States do not subscribe to the periodicals nor buy the books—even those that relate to their own special fields. The periodicals circulate to small subscription lists, and few professional books are printed, probably because teachers lack purchasing power. The net result is a large supply of educational knowledge that is pent up in the research reservoirs waiting to be pipe-lined into the million classrooms of the nation.¹

I. EVIDENCE OF THE LIMITED USE OF RESEARCH

We have numerous reports of small, but carefully conducted, investigations that bear out this charge. For example, there is the article of Briggs on "The Practices of Best High-School Teachers."² This article is based on the reports of an observer who visited 104 classrooms of teachers who were rated by their principals as "best teachers." This observer found that the practice in about four in every five classrooms consisted of "conventional teaching from a textbook." Briggs concluded that, "The evidence does not show that the teaching exemplified to any satisfying degree the theories which all these trained teachers have had presented to them in professional courses."

Again, as a part of "The Regents Inquiry" in New York State, Gray and Leary examined the reading practice in more than three hundred classrooms. They found in approximately ninety percent of the schools "routine formal practice."

¹ *What Does Research Say? A Statement of the Implications of Educational Research for Teaching in the Elementary School.* Pp. 7-8. (Bulletin No. 308. State of Michigan, Department of Public Instruction: Lansing, Michigan, 1937)

² Thomas H. Briggs. "The practices of best high-school teachers." *School Review.* December, 1935, 744-752.

Much more comprehensive than either of these were the studies made in connection with the National Survey of Secondary Education. In the various volumes reporting that survey we find many such statements as this:

Visitation and conferences indicated that the question-and-answer recitation, with many modifications in form, still holds a dominant place as a classroom procedure in the social studies. . . . Although suggestions for better procedures are listed in many courses of study, such proposals usually seem to be in advance of actual practices.³

Again in the report on *Instruction in Foreign Languages* there is the statement that the data assembled by the Modern Foreign Language study "are often misinterpreted and misapplied in such a way as to defeat their purpose."⁴

In the report on *Instruction in Science* the author concludes that "the data presented indicate that, in general, the courses of study are not based upon an adequate and clear-cut theory of education. . . . Observation of classroom teaching and the different suggestions given in the courses of study indicate great confusion as to the methods to be employed in teaching science."⁵

In brief, then, we have no reason to believe that the gap between educational knowledge and school practice is any less than it was when the "Committee on Economy of Time in Education" made its report in the *Eighteenth Yearbook* of this Society almost twenty years ago. It does not follow that there have been no advances in school practice within that period. Rather, in our opinion, advances in school practice have not been rapid enough to narrow the gap that existed at that time.

II. REASONS FOR THE LIMITED USE OF RESEARCH

Such factors as have contributed to the increased use of research in school programs or are now contributing to it merit attention. Before turning to that, however, it will be well to consider briefly certain obstacles to the increased use of research in the conduct of public-school affairs.

³ *Instruction in the Social Studies*. Bulletin, 1932, No. 17, Monograph No. 21. Pp. 101-102. (United States Department of the Interior, Office of Education, 1933)

⁴ *Instruction in Foreign Languages*. Bulletin, 1932, No. 17, Monograph No. 24. P. 32. (United States Department of the Interior, Office of Education, 1933)

⁵ *Instruction in Science*. Bulletin, 1932, No. 17, Monograph No. 22. P. 61. (United States Department of the Interior, Office of Education, 1933)

1. The Limited Training of Teachers

The past decade has witnessed great gains in the education of teachers. During the same period of time, however, we have gained a clearer understanding of the magnitude of the task of providing such professional education as will adequately meet the needs of the teacher in modern society.

When one ponders over the fact that one-fourth of all the teachers in the country must pass in review before one individual can be seen who has more than two years of training beyond the high school, the weaknesses of professional leadership become quickly apparent. When it is further considered that even these two years of training were probably taken in piecemeal sections and made up largely of "inspirational" and mechanical methods courses, the outlook is even more discouraging. Too many teachers now in service have the cultural outlook of the typical twelfth-grader rather than a mature and scholarly understanding of the world in which they live. No system of public education can be considered adequate so long as the most important agents in the educational process are inadequate.⁶

While we know that there are limits to the effectiveness of the usual courses in education, we have evidence to show that such courses do make a difference in the classroom practice of teachers. In the Yearbook of this Society on *The Textbook in American Education*, Bagley has shown that—

Whether a teacher will tend toward the use of the more formal textbook methods or toward the use of the methods more highly approved by contemporary educational theory would seem to depend in part upon his training. In general, the longer the training, the greater the likelihood that he will follow the latter tendency. There is a suggestion in our findings, however, that the type as well as the extent of the training has some influence here, and that the degree in which he will depart from the more formal types of teaching will depend in some measure upon whether he has been instructed in educational theory.⁷

⁶ *The Improvement of Education. Its Interpretation for Democracy*. Fifteenth Yearbook, Department of Superintendence. P. 108. (The Department of Superintendence of the National Education Association of the United States: Washington, D. C., 1937)

⁷ *Thirtieth Yearbook, Part II*, of this Society, 1931. P. 25.

2. The Limited Amount of Significant Research Carried on in Public Schools

If a great amount of significant research were being carried on by public schools, there would be a more ready acceptance of research findings for use in the school curriculum. Unfortunately, however, it is quite evident that important research is being carried on in relatively few public schools.

Some idea of the limited place of research in public schools may be secured by examining the programs of the American Educational Research Association to note the relative places of college and of public-school representatives upon those programs. On one recent series of programs, fewer than ten percent of the participants were public-school workers.

Another important index is provided by the comparative number of places held by representatives of colleges and of public schools on yearbook committees dealing with research problems. No one of the thirteen members of the committee that prepared this Society's *Thirty-Sixth Yearbook, Part I*, on "The Teaching of Reading: A Second Report," was from a public school.

More conclusive, however, is the summary statement in the volume on research published as a part of the National Survey of Secondary Education. The author of that volume concludes that—

In general, the reports of investigations submitted to the Survey indicate that bureaus of research in city-school systems devote the major portion of their time and energies to the compilation of facts and statistics . . . They do not have the time nor the resources to permit many investigations of a true research nature . . . If bureaus of research in city systems are to lead the way to a sounder educational program, they will find it necessary to place emphasis on fundamental problems of educational practice rather than on the mere compilation and publication of facts and statistics.⁸

In other chapters of this same report evidence is cited to show that the amount of significant research carried on by principals and teachers of public schools is negligible. It is but fair to note, however, that there are cities in which a real effort is made to promote significant research activities. Detroit is an outstanding example of this.

Once a year in Detroit the Department of Research holds a two-day educational conference, morning and afternoon. At this con-

⁸ *Research in Secondary Schools*. Bulletin, 1932, No. 17, Monograph No. 15. P. 71. (United States Department of the Interior, Office of Education, 1933)

ference individual members who have been carrying on research work during the year present papers, just as is done at any other technical meeting. The meeting is attended by principals, assistant principals, and such teachers as the principals judge are vitally concerned with the study being presented.⁹

The reasons for the limited research activities in most public schools are not difficult to find. One of the most important of these reasons is the fact that the authoritative concept in education has deep historical roots that do not yield readily to the experimental method. A second reason is that the attacks upon public education in recent years have been such as to discourage among school officials the questioning or experimental attitude so essential to research.

3. Lure of College Positions

To be called from a position in the public schools to a position in a college or university constitutes a promotion in the eyes of most school men. Whether the various types of rewards—monetary, social, and intellectual—common to the two types of positions justify this attitude is not of importance in this connection, but the outcome is of much importance, in that public schools are often deprived of the services of those superintendents, supervisors, directors of research, and directors of curriculum who are best qualified to lead in introducing research into curriculum practice.

4. Reluctance to Adopt New Procedures Successfully Developed in Other Schools

Those who have attempted to extend progressive developments from one school to others are well acquainted with the provincial attitude of the majority of public-school officials with regard to adopting successful innovations from other schools or adapting such innovations to their own situations. The failure of certain curriculums or demonstration schools conducted within public-school systems has been due in part to this attitude.

5. The Academic Nature of Much That Passes for Educational Research

The artificial stimulus that has been given to research activity by the requirements for advanced degrees has produced a surprising

⁹ Quoted from a letter from S. A. Courtis to the writers.

amount of uncoördinated, college-directed research that has been a deterrent to the healthy development of research programs in the public schools and to the utilization of significant research findings.

III. SOME PROGRESSIVE DEVELOPMENTS IN SPREADING RESEARCH FINDINGS TO SCHOOL PRACTICE

In spite of this rather discouraging situation with regard to the utilization of research findings, the past decade has been accompanied by several important advances that merit attention. Some of these are important because of the contribution they have already made to school practice. Others are important primarily because of the promise they hold for the future.

1. Improved Textbooks

Many students of education have concluded that textbooks constitute the major devil in American education and "the utter enemy of intelligent teaching." Be that as it may, the devil must still be given his due. That due, in this particular instance, is very great. Indeed, it may not be an overstatement to say that textbooks have done more to spread research findings throughout public-school practice than any other recent educational development.

The study of the professional status of authors of textbooks¹⁰ shows clearly that over a forty-year period there has been a marked increase in the percentage of textbooks written by students of education and leaders in educational research who hold positions in colleges and universities. This has been particularly true in the fields of reading, spelling, and arithmetic. In these fields we look to such students of education as Brueckner, Buckingham, Horn, Gates, Gray, Knight, and Schorling for the writing of our textbooks. But the same trend is apparent in such fields as language, health, science, and social studies. Prominent among the new authors of the past decade in these fields are such persons as Lyman, Hatfield, Powers, Beauchamp, Rugg, Hanna, and Hill.

2. Increased Summer-School Attendance

The increase of 500 percent in summer-school attendance within a period of two decades has certainly had much influence upon the spreading of research findings to school practice. The teacher who

¹⁰ "The Textbook in American Education." *Thirtieth Yearbook, Part II*, of this Society 1931. Chap. IV.

comes to summer school from the classroom is much more likely to grasp the significance of research and to apply research findings to his practice than is the undergraduate who has had no classroom experience.

3. Improved Digesting and Reporting of Research

The past decade has witnessed numerous attempts, many of them very successful, to prepare digests of research findings that can be used by busy school teachers. This Society has been a leader in that movement; witness, for example, the yearbooks on reading, curriculum-making, nature and nurture, music, arithmetic, geography, and science, which have brought together material that formerly was so scattered as to be largely inaccessible to public-school teachers and principals.

The fifteen yearbooks of the Department of Superintendence (now the American Association of School Administrators) represent another important contribution of a similar nature. The fact that the movement to discontinue the publication of such yearbooks was overwhelmingly defeated at a recent business session of the department indicates that superintendents feel there is great need for this type of educational service.

The digests of research published by the American Educational Research Association, over a period of several years, represent a third illustration of the new concern for bringing together, in usable form, research findings from many sources. More recently the Society for Curriculum Study and the Department of Supervisors and Directors of Instruction have made similar important contributions.

The Department of Public Instruction of the state of Michigan has undoubtedly made an outstanding contribution in its bulletin entitled *What Does Research Say?* This publication represents the serious and able attempt of a group of educational leaders to put research findings into common practice throughout the schools of Michigan.

The annual reviews of research in various educational fields prepared by Gray, Lyman, and others of the University of Chicago illustrate another contribution in this field.

No list of this sort would be complete without reference to the very important summaries of historical and sociological research that have recently been made available through the reports of the Commission on the Social Studies of the American Historical Association and the

publications of the Educational Policies Commission. The Research Division of the National Education Association has assisted this latter organization, as well as several of the divisions of the Association, in gathering and summarizing the research data for their publications.

4. Development of Long-Time Programs for School Improvement

In Part II of the *Twenty-Fourth Yearbook* of the Society, Courtis reported a study of the relative effectiveness of various methods of supervision as means of training teachers for individualized instruction. That study showed that the ordinary type of loose, general supervision was relatively ineffective "in bringing about radical changes in point of view on a large scale" and that "under existing conditions, changes in the right direction can take place in a system of any size only very slowly."¹¹ While this particular study dealt with a single type of instructional problem, there is no reason to believe that these conclusions would not be equally applicable to other types of instructional change.

During the past decade a large number of individual schools, cities, states, and professional bodies have accepted the fact that significant changes in curriculum cannot be brought about in haste or by chance methods and have, therefore, launched out on long-time curriculum programs. Such programs as those of the Parker School District of Greenville, South Carolina, and of the McKinley High School, in Honolulu, Hawaii, represent the best type of individual school planning.¹² Pasadena and Fort Worth provide good examples of long-time city programs; Virginia and California, of long-time state programs. The Eight-Year Study of High School and College Relationships and the accompanying study of the secondary curriculum now sponsored by the Progressive Education Association are yet other outstanding illustrations of long-time curriculum programs that have as one of their major aims the putting of research findings into practice. The Summer Workshop Conference, sponsored by the committees directing these latter studies, brought together a large number of teachers involved in the Eight-Year Study for the sole purpose of studying under expert leadership those problems directly related to their own classroom and school situations. Both the teachers and the leaders of the con-

¹¹ "Adapting the Schools to Individual Differences." *The Twenty-Fourth Yearbook, Part II*, of this Society, 1925. P. 254.

¹² Henry Harap, Editor. *The Changing Curriculum*. (D. Appleton-Century Company: New York, 1937). For discussions of many of the programs referred to here and of others as well, see Chapters IX, X, and XI, pp. 178-308.

ference testify that the workshop idea is a sound technique for transferring the findings of research to the classroom plans and practices of teachers.

IV. THOUGHTS FOR THE MORROW

If the next decade witnesses greater progress than the last in putting our knowledge of education to work, it will be primarily because teachers and school executives become increasingly critical of routinized teaching, more anxious to provide the youth of America with an education adequate to meet their needs, and more objectively critical in the study of the results of the programs they direct. While these attitudes might not guarantee that the schools would utilize the findings of research, they would create a felt need for objective evidence as a basis for the confidence of teachers and administrators in the worth of the curriculum of the public schools. Teachers who have a vision of the place of public education in our democracy are most likely to welcome the findings of research.

Closely related to this need for vision is the need for outstanding leadership in encouraging, coördinating, and publicizing research. And this leadership must be provided in larger part by city and by state authorities if desired gains are to be made in school practices. City and state authorities might very properly substitute for institutes, conventions, and even much summer-school attendance, extended work sessions similar to those conducted by the National Youth Administration and the Works Progress Administration Program for Adult Education for their workers. There is a very great need for a new attitude toward all our conferences and summer schools, such as will convert them into centers from which new and significant developments will radiate.

There is, however, tremendous need for a more compelling or universally accepted type of leadership in research activities.

In part this leadership is being provided and can be provided by the National Education Association. But there is little reason to believe that that association, with its 200,000 members or even with its potential membership of 1,000,000 teachers, can ever provide the funds that would be needed to maintain a research program adequate for the nation's schools. There are many persons who believe that the Federal Government must provide more assistance in the development of a comprehensive program of research for American education.

The part that the Federal Government might play in educational research has been outlined in a recent report from the Office of Education to the President's Advisory Committee on Education. A portion of that report is quoted here because the writers believe it merits careful study.

Experimental research has been the basis upon which progress has been made in both agriculture and industry. The system of agricultural experiment stations maintained at the land-grant colleges and universities with the aid of the Federal Government has clearly demonstrated the value of the experimental method in agriculture. The fact that most of the large industrial companies maintain extensive research laboratories is conclusive evidence of the values attached to the experimental method by industry. . . .

Education is the public's biggest business. It costs about three billion dollars of public money a year. Its control is in the hands of state and local authorities, who cannot (or certainly cannot economically) maintain an adequate research establishment to test hypotheses in the field of education. But it is extraordinarily important to protect this three-billion-dollar annual expenditure against the losses due to the adoption of practices which prove later to be unsound. It is at the same time exceedingly important to take positive measures to facilitate desirable changes and to prevent the stagnation which may easily result from the lack of a proving ground for proposed changes in education.

Such a plan for nation-wide experimental research in education, while subject to many variations, should probably be characterized by the following:

- (a) The Office of Education with the aid of an advisory committee representing the principal educational fields and research institutions of the country should map out the general outlines of an experimental research program and specify the criteria essential for any agency to be approved for participation in the federally subsidized program.
- (b) Agencies such as universities, state departments of education, and city school systems having research bureaus should be invited to note the specifications thus mapped out and to apply for an allocation of funds to carry on certain projects within the program for which they feel qualified.
- (c) On approval of the application, Federal funds would be made available to aid in carrying through the project. The agency

should contribute a share of such support, the percentage varying, possibly, according to the nature of the project.

- (d) When the Federal funds have been made available to a research agency, the responsibility for carrying out the project will lie with the agency. General supervision will be provided by the Office of Education.
- (e) Some agencies might be approved on a more or less permanent basis to carry on a long-time program of experimentation, while others might be approved for carrying on a single project.¹³

SUMMARY

In this presentation we have been concerned with the problem of translating research into school practice. We have expressed the opinion that the gap between research and school practice is as great as it was a decade ago. Among the factors that contribute to the maintenance of this gap, the following are of major importance: (1) the limited training of teachers, (2) the limited amount of significant research carried on by public schools, (3) the constant transfer of those persons most competent to lead in promoting the use of research from public-school to college and university positions, (4) the provincial attitude of many teachers and administrators, (5) the limited significance of much that passes for research.

The decade has not, however, passed without significant gains having been made. Perhaps the two advances of most significance are the improved digesting of research and the planning of long-time curriculum-improvement programs by a limited number of state, county, and city schools.

The time is ripe for the development of a more compelling leadership to promote the widespread utilization of research. We have still to determine the most effective source or sources for that leadership.

¹³ *Research and Information Activities of the Office of Education*. (Prepared for the President's Advisory Committee on Education by the United States Office of Education: Washington, D. C., September, 1937. Part I, pp. 17-19)

CHAPTER V

CONTRIBUTIONS OF RESEARCH TO GENERAL METHODS OF INSTRUCTION

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I. GENERAL METHOD AT THE CLOSE OF THE NINETEENTH CENTURY

Our brief survey of the contributions of scientific study to methods of instruction should be prefaced by a characterization of the general method prevailing in typical public schools at and before 1900. The following vivid description is quoted from Reisner's *The Evolution of the Common School* (pages 427f.):

The effect of all the factors surrounding the graded school of the generation following the Civil War was to develop a school machine. In contrast with the school conditions of a generation preceding there was a great deal more material included in the graded course of instruction, but the quality of teaching and learning was improved hardly at all. From the lowest grade to the highest the pupils followed an endless succession of book assignments which they learned out of hand to reproduce on call. The chief end of pupils was to master skills and learn facts as directed by a teacher who, in turn, was under the automatic control of a printed course of study, a set of textbooks, and the necessity of preparing her class to pass certain examinations on the contents of a specific number of printed pages. From the standpoint of discipline the physical cruelties of the earlier day had to a large degree disappeared, but the control exercised over the pupils was at least negative. The business of the school being what it was, any movement, any conversation, any communication, were out of order. The spirit of control was military and repressive, not constructive and coöperative. Long rows of seats, military evolutions of classes, stated appearances for recitations, with the rest of the school time devoted to narrowly prescribed exercises, had for their moral equivalent being quiet, industrious at assigned tasks, and sub-

missive to the rule of the drill-sergeant in skirts who unflinchingly governed her little kingdom of learn-by-heart-and-recite-by-rote. . . .

Those of us who are concerned with the improvement of instruction in the common schools can recognize many features of the school described above as the very conditions which need to be changed and improved at the present time. Indeed, the mechanical graded system in which the chief school exercise is learning by heart, and the chief pupil virtue conformity, has been the object of criticism of every movement of reform in instruction and discipline in the United States for the last seventy years.

In 1900, as at the present time, there were several conceptions of education that were definitely hostile to such methods of teaching. Most of these were theoretical conceptions derived from general philosophy or, at the most, evolved from empirical sources and none was accepted rapidly or widely by American school men. Several methods originated in the philosophy of Pestalozzi. The most famous of these, the 'object teaching' plan that substituted isolated objects for textbooks, made only limited headway despite the extraordinary publicity campaign waged by Dr. Sheldon of the Oswego Normal School between 1860 and 1880. The idealistic and mystical philosophy of Froebel, with its emphasis upon children's play and freedom as means of self-realization, was clearly hostile to the prevailing methods. Although Froebel's teachings were advocated by a powerful group in America, and although they were responsible for the establishment of kindergartens in approximately two hundred cities by 1900, they affected practices in the school grades but little. Herbart's less mystical, but nevertheless empirical, psychology, advocated by several powerful figures, especially in the nineties, led to the establishment of radical innovations in certain experimental—usually private—schools, but never became widely accepted as a basis of educational philosophy or practice.

During the two decades prior to 1900, another type of approach to the problems of education made its appearance. It found its best expression in the writings of William James, especially in his *Principles of Psychology*, published in 1890. The doctrines embodied in the *Principles* quickly took command of the field and became the major source of reform in methods of teaching in America. It is important to realize the factors involved in this choice.

While many influences were operating in favor of the acceptance of the doctrines of James rather than those of Froebel, Pestalozzi, Herbart,

and others, the main one is probably to be found in the fact that James' works were based upon the newly developing biological and social sciences and were not, as the others, primarily sheer philosophical, logical, or empirical structures. James' policies and points of view became speedily accepted, not because he was an American, but because something in the American temperament made his pragmatic approach enormously satisfying. As James became immediately famous in all learned circles for his extraordinary ability to canvass the whole array of scientific data and extract from it the practical implications for everyday life, so he became the inspiration that led men into scientific study as a means of solving problems of education.

Although James himself was a specialist in generalizing on the basis of scientific data rather than in experimentation, his work was most influential in establishing a place for scientific research in education. The history of the reaction of schoolmen to the problem of 'formal discipline' illustrates this fact. Most teachers and officers in commanding positions in American schools in 1900 had, as students, used Noah Porter's *Elements of Intellectual Science* or similar treatises that were based on faculty psychology and that justified formal discipline as the basis of method in education. Although Herbart's psychology, which became widely known during the nineties, attacked these doctrines severely, it was unconvincing to many. James' *Principles* took the notions severely to task and offered a system hostile at every turn, but schoolmen, despite their enthusiasm for the new psychology in general, were not deeply stirred on this matter. It was the appearance of the results of the first scientific study of formal discipline, published by Thorndike and Woodworth in 1903, that shook the older convictions to the core. This report created a veritable explosion of interest and relatively rapid conviction. That a page of experimental proof should be more convincing as well as more startling than volumes of the most persuasive arguments and theory is a matter of real historical significance.

As regards the reaction to methods of instruction, this attitude has been characteristic of American education for the past thirty-five years, during which changes that have received favorable hearing on a wide scale seem mainly to have sprung directly or indirectly from the data of science. Many have been suggested by thinkers like Dewey, Kilpatrick, Bode, Bagley, and others who, though not primarily investigators, have been engaged in synthesizing and applying scientific

data to education. Others have been contributed by persons like Judd, Thorndike, Terman, Freeman, and others who were investigating directly as well as generalizing. Still others grew up in venturesome schools or occasional classrooms from ideas springing from the preceding sources. Many changes in methods, finally, resulted from carrying over into school practice the use of devices, such as intelligence and achievement tests, that had been developed in the laboratory.

That the past thirty-five years have witnessed radical modifications in methods of instruction, few would deny. That these modifications have, on the whole, been improvements few would doubt. That progress in many respects has been hampered by too exclusive dependence upon the results of scientific inquiry, some persons have recently begun to insist. During our survey of changes wrought during these years, some suggestions concerning the justification for these views will be offered.

II. THE CHIEF FACTORS THAT HAVE CONTRIBUTED TO MODIFY GENERAL METHOD

1. New Conceptions of the Nature of the Learning Process

Innumerable modifications in methods of instruction have resulted from new conceptions of the learning process. In 1900, "learn-by-heart-and-recite-by-rote" was the policy. The new dynamic psychology of James established the idea of learning as an active, complex process and the learner, even the very young one, as an organism that learned by reacting—by perceiving, discriminating, judging, achieving insight, weighing alternatives, reaching decisions, acting, and feeling—in the situations in which the occasion arises. The organism, according to this concept, learns by adjusting itself to concrete situations, by solving the problems that life presents to it. One learns to meet a situation by guided experience in meeting it—not by formal, isolated *preparation* for meeting it. Carried forward by investigating and reflecting, this general conception, in the works of Dewey, Kilpatrick, Judd, Thorndike, and many others, led to radical changes in educational conceptions and practice. Although even the most widely accepted conceptions are not now universally found fully in practice, some modifications of method implied by them will be seen in nearly all schools. They appear in such forms as (1) an increase in 'activities,' such as observing and reporting about things and events in the environment; (2) discussing, planning, and executing projects; (3) expressing ideas in free report,

drawing, modeling, constructing; (4) solving problems, making applications instead of reciting by rote; (5) synthesizing wide reading instead of memorizing a single assignment; (6) participating in a variety of free-time, elective, and extra-curricular activities; (7) developing school publications, dramatic presentations, projects of various sorts; (8) participating in practical arts and using various forms of practical equipment; (9) employing a greater variety of teaching materials (typewriter, workbooks, radios, libraries, etc.) and teaching methods (discussion groups, lectures, directed study, debates, laboratory work, etc.).

Contributions to the newer conceptions of the learning process came from many sources, of which but a few may be mentioned. Of supreme importance were the studies of mental discipline and the transfer of training initiated by Thorndike and other psychologists about 1903. These led directly to the conceptions that the reactions—knowledge, skill, attitudes—acquired by children in school should either be as genuine and true to life as possible or, at the least, should have as much in common with typical out-of-school activities as possible. This ‘social utility’ criterion became basal in the early objective appraisal of the subject matter and activities of the curriculum that, beginning with investigations of spelling vocabulary by Ayres and others about 1910, led to innumerable projects in ‘curriculum research.’

Again, a host of analytical studies of the learning processes involved in problem-solving by human and animal subjects, in various laboratory functions, in the subtler phases of the school subjects, in social adjustments and, in general, in the more complex acts of discrimination, judgment, and reasoning, contributed greatly to the development of methods of guidance.

Investigations of children’s mental activities and learning processes in the child-study movement, greatly stimulated by G. S. Hall in the nineties, and of intelligence and problem-solving in the intelligence-test movement, given great impetus by the publication of the Binet scale in 1905, were of great significance. They broke down a common idea that children reach the reasoning and judging stage only in the late teens after passing through a succession of lower mental stages; they demonstrated the fact that the child from the earliest years reacts, learns, and reasons qualitatively much as he does later.

The child-development movement, of conspicuous activity since the early twenties, has been a most fortunate companion for the very ex-

tensive program of investigations of the school subjects, since it has been notably fertile in disclosing the character of learning in non-school activities, like eating, walking, singing, handling objects, solving mechanical problems, making adjustments to other persons, and so on.

Finally, the appearance of MacDougall's *Social Psychology*, in 1914, gave great impetus to the study of human activities and learnings in social situations, results of which are clearly reflected in current theory and practice.

From these and other lines of scientific study emerged facts and theories that were applied in the development of methods of instruction. It is important to note, however, that the extraction of pertinent data and the organization of them into systematic theory and practice of teaching comprise an achievement of major importance. In this enterprise the work of Dewey, Kilpatrick, Bode, and others who were not primarily investigators has been most conspicuous. Even William James was not a scientific research-worker in the narrow sense.

2. New Conceptions of the Child as Learner

A fundamental conception based upon numerous and diverse investigations is that a method of instruction cannot be profitably considered in isolation from the learner and the teacher. The lecture method may be good or bad, depending on the teacher's presentation and on the pupil's attitude at the time. Investigation of the nature of the child as an organism has shed as much light on methods of instruction as has study of methods *per se*, and most illuminating of all has been the study of the teacher-and-pupil-in-the-learning-process.

The practices of the typical school of forty years ago embodied the notion that the child was indifferent, if not hostile, to learning. The most important demonstration of research conducted since that time is that the child from infancy is the most eager and insatiable learner—of things that touch his needs and interests and fall within his sphere of action. With this general truth in mind, Dewey resolved the interest-versus-effort controversy. From this general truth, scores of more specific practical dicta have been derived that reveal themselves in every aspect of method in the superior school. The necessity of adjusting instruction to the pupil's level of ability and emotional concern, of relating it to his dominant purposes, of arranging it to give reasonable play to his own tendencies and inventiveness, of planning it to provide him with a tangible issue that he recognizes as successful achievement, of

making manifest some evidence of growth in power—these are samples of the criteria by means of which good methods are now recognized.

The general conceptions, which now seem quite obvious, are the issues of many lines of investigation, most of which may be traced back directly or indirectly to Darwin's theory of organic evolution. Darwin's basal conception of original nature and the process of growth became the inspiration of much of the work of Hall, James, Thorndike, Judd, Dewey, MacDougall, Freud, Sherrington, Galton, Binet, Terman, Freeman, Bagley, Cannon, Woodworth, Whipple, and many other leading forces in education and related biological and social sciences. Hall's *Psychology of Adolescence*, James' chapters on instincts, emotions, and habits in his *Principles of Psychology*, Dewey's *Interest and Effort in Education*, Thorndike's *The Original Nature of Man*, MacDougall's *Social Psychology*, Cannon's *Bodily Changes in Fear, Rage and Hunger* represent enormously influential summaries and interpretations of results of the rapidly developing investigations of instincts, native and acquired likes and dislikes, interests, motives, purposes, various organic adjustments, and the processes of growth. Of outstanding influence were Dewey's several books, especially *School and Society* (1899) and *Democracy and Education* (1916), analysing educational aims and procedures in terms of the new biological concepts, and Thorndike's survey and interpretation of experimental work in his three volumes, *Educational Psychology* (1913-1914). In his "Law of Effect"—the general dictum that the organism repeats and learns those reactions that satisfy whereas it fails to repeat and learn those that annoy—Thorndike made interests, urges, and biological tendencies the basal dynamics of learning—the initiating and sustaining forces.

During the last two decades, there has arisen a suspicion that the earlier biological conceptions of child nature were over-simplified by too great a dependence on behavioristic studies of animals. The result has been a host of more critical studies of the rôle of interests, preferences, readiness (*e.g.*, 'reading readiness') temporary attitudes, and inclinations both in relation to various constitutional factors, such as intelligence, age, health, glandular conditions, and sex, and also in relation to temporary conditions, such as fatigue, hunger, temperature, stimulation, and to various aspects of previous experience, such as the equipment of knowledge and skill, emotional 'conditionings,' shocks, disappointments, and 'complexes,' as in the psycho-analytical approaches. Out of these studies have grown the convictions that effective

teaching requires very deep and very subtle insight into human nature, that the growth of personality is a concomitant of all learning and hence of primary concern of the teacher, and that education at its best is primarily directed to effective guidance of the human being rather than merely to the teaching of subjects.

3. Clearer Recognition of Individual Differences

Recognition of the vital rôle of child nature in the learning process led to more intensive study of the characteristics of individuals. In this area the methods of science proved to be notably fertile, and the effects upon methods of instruction were profound.

The Darwinian conception of the process of evolution stressed the rôle of small individual differences within a species. The work of Galton, who first applied statistics to the study of heredity and individual differences; of Karl Pearson, who carried it forward; of Cattell, who introduced this approach to American psychology; and of Thorndike, who became the leader in the quantitative study of human nature, will be described in greater detail in another chapter. Study has gone forward along many lines since 1900. Tests of intelligence, mechanical aptitude, motor dexterity, musical aptitude, esthetic insight; of skill in reading, writing, arithmetic, drawing; of knowledge of words, history, mathematics; of tastes and discrimination in music, art, costume design, all gave new and clearer insight into the native equipment and acquired abilities of the individual. Soon investigations of special abilities and disabilities demonstrated the existence of such a range and variety of patterns in an individual's make-up as to make educators appalled at the consequences of mass instruction. Later investigations have attempted to find simplification for instruction by search for 'common factors' in intellectual and personality traits and to determine the rôle of each measurable factor in various forms of learning and adjustment. From these sources, comprehensive programs of measurement, of diagnosis, and of adaptation of instruction to meet individual needs have become a striking feature of methods of instruction. Examinations of intelligence, physical maturity, social competence, reading readiness of entering children; the use of various forms of classification and grouping, arrangement of materials, and conduct of class instruction; extensive use of self-manageable aids; the frequent measurement of achievement; the systematic diagnosis to determine the nature and sources of special difficulties in various subjects and activi-

ties; the efforts to locate causes of inattention, social maladjustment, or emotional stress; the employment of special remedial materials and methods; the rapidly growing interest in vocational, educational, and various forms of individual guidance as a feature of everyday school work, all are examples of modifications of methods of instruction issuing from research in individual differences. The detailed make-up of each child, rather than the characteristics of childhood in general, is becoming the focus of the teacher's study. The credit for this profound change in method belongs almost exclusively to scientific study.

4. New Conceptions of the Rôle of the Teacher

The newer conceptions of how learning takes place, of the rôle of the pupil as a dynamic factor in the process, and the need of adjustment of instruction to individuals led inevitably to a new conception of the rôle of the teacher. From "the drill-sergeant in skirts" of 1900, she has become—in theory at least—a person who must understand, help, and guide children. The consensus of experts today would probably favor such opinions as: "The teacher's place in a school is to stimulate, to criticize, to suggest, to evaluate, to help the group meet problems and find means of solving them." "The teacher should recognize the special interests, tendencies, abilities of each individual learner, and guide and direct them along lines most fruitful to him and to society." That such ideals should profoundly influence methods of instruction is too obvious to require further illustration.

5. The Rôle of the Social Setting

As a final aspect of general method, the influence of the setting in which learning goes on may be briefly considered. The theory that education made the pupil ready for life by formal strengthening of the intellectual faculties implied that the learning situation was negligible as long as it provided opportunity for effective control and discipline. The new theory of learning stated that the reactions acquired in the learning situation would function in another setting to an extent roughly proportional to the psychological factors common to the two. This principle implied that the total environment of the child in the learning situation is a determining factor in what is learned and in the way learnings will function.

To John Dewey, more than to anyone else, education is indebted for exploring this crucial issue and for suggesting practical solutions.

He saw at once the restricting influence of the closed-in, barren, artificial character of the typical school. He asserted that the school should be a place where children learned during the process of living naturally in a social environment appropriate to their natures and harmonious with desirable community life of the times. In several volumes he has made his proposals in some detail. His views of education as 'living' in a democratic society profoundly influenced methods of teaching and also raised innumerable subtle questions to challenge the embryonic social sciences. It should be freely admitted that scientific study, in the strict sense, has contributed *directly* far less to the development of social theories of education, promulgated by Dewey and others, than to any other aspects of the problem of method. Doubtless, much of value was gleaned from anthropology, sociology, and social psychology, but not until 1920 or later have the two latter sciences attacked the educational issues very directly. Since that time, however, the scientific method has been making itself felt. Sociological analyses of social, political, and other institutions and psychological attacks upon behavior of children and adults in various social settings have been increasingly numerous and fruitful.¹

III. METHOD IN THE NARROWER SENSE

The past forty years have produced hundreds of studies of methods conceived in a narrower sense. There have been studies of distributed versus concentrated practice and review, learning by parts versus learning by wholes, memorizing by reading versus recitation, reading versus listening versus observing motion pictures, learning by pursuing projects compared with solving problems or wide reading, by extensive reading compared to intensive reading, teaching by practice exercises versus longer assignments, by remedial instruction rather than sheer review. The significance of graphic presentations, still pictures, motion pictures, dramatized episodes, lectures, free-study periods, supervised study, excursions, laboratory demonstrations, creative enterprises, and other devices has been investigated. Programs embodying various degrees of freedom for the pupils to plan their own time schedules, questions, problems, assignments, or entire programs have been put into practice and, in some measure, checked upon. Many studies of different lengths

¹A recent survey of the literature of psychology shows more reports in social psychology than on any other branch, except educational psychology in general. Prior to 1920, the number of studies in this field was near the bottom of the list.

of time for school activities, different types of approaches to assignments, different sizes of classes, and many other aspects of instructional procedures have been made. Much time and energy have been devoted to careful investigation of these types. They are, in proper form, well worth the costs. They are not given a place of first importance in this chapter, however, for the reason that the writer considers them to be clearly less important than the broader issues and necessarily subordinate to them.

One source of the restricted significance of studies of various methods in the narrower sense lies in the fact that the operation of a method or a device depends on the total situation in which it functions. The teacher, the pupil, the total situation, and the method form a functional whole. Except as viewed in relation to the technique of the particular teacher with pupils of well-defined characteristics in a definite learning situation, the method is far from tangible. A lecture or an excursion or a project or a discussion will have different outcomes in different total learning situations. The value of any such method depends, moreover, on the extent to which it is adapted to the requirements of the total setting. In fact, the more important developments have taken the form of moulding such procedures to serve most fully the major purposes of learning in each of various situations. On the other hand, many errors of interpretation—especially unqualified general approval or disapproval of various methods, devices, and procedures—have resulted from failure to sense and control all components of the learning situations under examination. Research designed to establish the validity of putting a principle into practice in concrete form, however, is indispensable to professional progress. Much research on ‘methods’ in the narrower sense has been of this type.

IV. CONCLUSION

In conclusion, it may be stated that in the study of methods of instruction, the scientific approach has produced substantial justification for the respected position in which it is now held in American education. In a single generation the way of science has been accorded first choice. It is certain to be continued with hope and respect as the typical American approach for many years of further trial. If the bright promise that the past generation of work has justified is to be realized, there must be a continuation of the best features of the past and a correction of several obvious defects of much current activity. The disposition of

some investigators to fail to see the larger aspects of their problem, to neglect to control significant variables, to disregard the bearing of their work on general theory could lead to a situation in which the progress of excellent, new ideas would be retarded rather than fostered. For specialists in scientific study to set themselves apart from the course of critical and creative theoretical inquiry would be as fatal a mistake as for the theorists to disregard the results of experimentation. Broader views, and more searching criticism of both investigation and generalization, as well as more and better research, are required to enable the scientific method to realize its high promise.

CHAPTER VI

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: HANDWRITING

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The development of the teaching of handwriting, as of the other subjects, is the result of more than one factor. According to the purpose of this Yearbook it is appropriate to dwell particularly on the effect of scientific investigation on the teaching of the subject. It is recognized, of course, that changes in teaching took place before handwriting was studied scientifically. It is also recognized that factors other than scientific study have modified the teaching of the subject since the scientific movement in education began. It is believed, however, that scientific study plays a relatively large part in the evolution of the teaching of handwriting at the present time and that such study gives greater stability to the teaching of handwriting than it possessed in the earlier period.

I. TYPES OF STUDIES

Before tracing the specific effect of scientific studies upon the teaching of handwriting, it may be helpful to indicate something of the scope of these studies. They may be classified under several heads. First, certain investigations in the fundamental sciences have a bearing upon handwriting. These sciences are particularly physiology and psychology. Occasionally medical studies throw light upon the treatment of handwriting in the school. Second, experimental analysis of the writing process itself throws light upon how children learn to write and how they may effectively be taught. Such analysis is usually carried out in the laboratory, but the simpler types may be carried on in the classroom. A third method, the analysis of errors in letter forms, is used in diagnosis and remedial work. Fourth, surveys of writing give information about the attainment of the writing of children of different ages

and grades and under different conditions and have bearing both upon aims and upon methods. Fifth, the measurement in the classroom of the attainment of pupils taught by different methods enables us to compare directly the efficacy of these methods. Supplementary to these direct methods of investigation is the study of the historical development of handwriting. This includes the development of primitive graphic methods leading up to the discovery of alphabetical writing and the changes in styles and methods following this event. Finally, the study of graphology, or the relation of handwriting to character or the individual's general mode of behavior, bears on the development of individuality of style. All these methods of investigation will be illustrated in the description of the development of the teaching of handwriting and in the discussion of the factors that have brought about changes in teaching methods or in aims.

II. PREVIOUS METHODS OF TEACHING

We may preface the description of the major changes in the teaching of writing during the past generation by a brief account of the situation preceding this generation. In the middle of the nineteenth century a style of writing had been developed in this country largely under the leadership of Platt R. Spencer, commonly called 'Spencerian' writing. This writing was somewhat simpler and characterized by fewer flourishes than the English writing from which it had been derived. But it was a very careful, rather slow style with some shading. Out of the Spencerian writing was developed the more rapid and fluent and somewhat simpler style of writing called 'muscular movement' or 'arm movement' writing. A. N. Palmer was one of the main expositors of this style of writing. A more moderate representative of this school and one with a broader point of view was C. P. Zaner. Mr. Zaner and his associate, E. W. Bloser, were influential in training supervisors and teachers.

The development up to this time had apparently been a gradual evolution of methods brought about by the inventions of handwriting specialists. During the nineties an importation came from England that had a different origin. Physiologists and hygienists in Europe had for some time been studying the effect of writing on children's health. They believed that the extremely slanting writing, and the side position in which it was ordinarily produced, had a harmful effect upon children's posture as well as upon their eyesight. They advocated vertical writing as a means of eliminating these harmful effects, and a system

of vertical writing was worked out by Jackson.¹ This style of writing was also advocated because of the simplicity of the letter forms and the ease with which it presumably could be read and written.

Vertical writing, thus supported by the considerations of physiology and medicine, made a strong appeal to educators and was widely introduced during the nineties. This illustrates the modification of school practice through the application of general scientific principles by deductive methods. That this method is deficient, if used alone, is illustrated by the subsequent history of vertical handwriting. Vertical handwriting made it somewhat easier for pupils to maintain a good posture and it may have been easier for their eyes, though there is no proof on this point. However, it soon encountered major difficulties from the point of view of the handwriting movement. Vertical writing is produced by placing the paper at right angles to the edge of the desk. This position makes it difficult to move the hand smoothly across the page by swinging the forearm about the elbow as a pivot. When this difficulty was encountered many specialists in handwriting endeavored to devise a method that would secure the advantages of vertical writing and at the same time make possible the freedom of movement characterizing the old arm-movement writing. This led to a number of compromise styles that were based, not on a thorough restudy of the problem, but rather upon an attempt to reduce the harmful effects and secure the benefits of vertical writing by introducing its characteristics in a lesser degree. Such a compromise may sometimes be necessary, but the elements that are to be included and the proportion between them can be better worked out by a thoroughgoing scientific study of all the elements than by an attempt to combine a scientific study of part of them with practical experience regarding the rest.

III. EXPERIMENTAL STUDIES

Shortly after the turn of the century a beginning in the experimental analysis of the handwriting movement was made by Judd, who devised an instrument by means of which the relative part played by the arm and the fingers could be distinguished.² This pioneer study was fol-

¹ John Jackson. *The Teaching of Handwriting. A Practical Reference and Guide-Book for Daily Use in the Teaching of Vertical Writing.* (W. B. Harrison: New York, 1895. 55 pp.)

² Charles H. Judd. *Genetic Psychology for Teachers.* Chapter VI. (D. Appleton-Century Company: New York, 1903. 329 pp.)

lowed up by further laboratory work by McAllister³ and later by Freeman,⁴ who used the kymograph method and the motion picture.

These studies showed the impracticability of the extreme muscular-movement writing, especially for young children. They brought out the mechanical conditions necessary for easy and fluent writing in respect to the position of the paper and of the hand and of the method of holding the pen. At the same time they brought out the relation between the speed changes of the writing stroke and the form of the letter and indicated the fundamental importance of rhythm in writing. They probably contributed to the adoption of a relatively stable and widely accepted style of writing and method of teaching.

IV. STANDARD TESTS

Contemporaneous with the laboratory studies mentioned was the development of standard tests by which the attainment of children could be measured with a far higher degree of accuracy than could be attained by marks based on unaided judgment. The earliest and most widely used scales were those of Thorndike⁵ and Ayres.⁶ Scales and score cards for analytical measurements have been devised to indicate, not only the general merits of the pupils' writing, but also the particular faults that may need correction.

The use of standard tests made it possible to compare the attainment of pupils in different cities or different parts of the city, as was often done in general or special school surveys, and to attempt to relate the differences in attainment to differences in time devoted to writing or in the methods used. Tests have also been made of the writing of adults in various walks of life or occupations, and the results of this examination have thrown light upon the standards of attainment to be adopted in the school.

³ Cloy N. McAllister. *Researches on Movements Used in Writing*. (Studies from Yale Psychological Laboratory, 8: 1900, 21-63.)

⁴ Frank N. Freeman. *The Handwriting Movement: A Study of the Motor Factors of Excellence in Penmanship*. (Supplementary Educational Monographs, University of Chicago. Chicago, 1918. II, 3, 169 pp.)

⁵ Edward L. Thorndike. "Handwriting." *Teachers College Record*, 11: 1910, 83-175.

⁶ Leonard P. Ayres. *A Scale for Measuring the Quality of Handwriting of School Children*. (Russell Sage Foundation, No. 113. New York, 1915)

V. ANALYSIS OF ERRORS IN LETTER FORM

The score cards and analytical tests that have been referred to are used to diagnose the particular faults in pupils' writing and to indicate the points pupils should emphasize in their practice or the types of remedial work that should be undertaken. In special cases still further types of analysis may be carried on. When the pupil shows a disposition to write with his left hand or when difficulties in reading or in speech suggest that a lack of clear dominance of the right hand may be responsible, the diagnosis of the pupil's hand preference is an essential basis for a decision regarding his instruction.

These types of analysis of the behavior of the pupil are supplemented by an analysis of the writing itself. The commonest type of such analysis is a count of the frequency of various types of errors on the different letters.⁷ It is found, for example, that some letters, such as *e* and *r*, account for a larger proportion of the illegibilities in writing than the frequency of the letters themselves would indicate. This has suggested methods of remedial instruction and even methods of basic instruction directed toward the removal of the specific errors found to be most frequent. Rapid improvement has been shown to result from such concentration on the points of greatest need.

VI. THE ISSUE OF MANUSCRIPT VERSUS CURSIVE WRITING

The most prominent current issue in handwriting has resulted from the introduction of a new style of writing somewhat comparable to the introduction of vertical writing in the nineties. Manuscript writing, or print writing, like vertical writing, was introduced from England. It is a revival of the style of writing used in the preparation of books before the age of printing. Its use was advocated in the first instance because of its beauty and legibility. Many teachers in England were convinced of its superiority and it was adopted in a large number of schools. When it was brought to the United States soon after 1920, it appealed to a great many teachers here and was introduced into a good many private schools and into some public schools. Because of the disposition that had grown up in this country to evaluate new procedures as objectively as possible and perhaps because of the memory of the fiasco of

⁷ Luella, C., and Sydney L. Pressey. "Analyses of three thousand illegibilities in the handwriting of children and of adults." *Educational Research Bulletin*, 6: 1927, 270-273. Ohio State University.

T. Ernest Newland. "A study of the specific illegibilities found in the writing of Arabic numerals." *Journal of Educational Research*, 21: 1930, 177-185.

vertical writing, manuscript writing was looked upon with somewhat greater caution and reserve in this country than in England. Teachers and administrators were not satisfied to trust their impression concerning it, but undertook a number of scientific studies of it.

There is still some difference of opinion concerning the results of these studies and concerning their practical application. It seems pretty clear that manuscript writing is easy for the child to learn at the beginning and that its use is favorable to learning to read and spell.⁸ Its advantage or disadvantage as a final style of writing is not so clearly established. The prevailing opinion on both historical and experimental grounds is that cursive writing of a moderate type is more suitable to older persons. The prevailing practice in public schools where manuscript writing is used is to confine it to the first two or three grades. Later evidence and experience will indicate whether or not this is the best practice.

VII. INDIVIDUALIZED WRITING

Manuscript writing raises a question on which there has been little comprehensive or general study. This is the question of the best form of letters or the best general style of writing. Changes have been made from time to time in letter form and in style, but these changes have not been the result of systematic investigation. A beginning in such investigation was made by Boraas⁹ who compared the ease of writing the different forms of certain capital letters. He found, for example, that one form of the capital *H* could be made a good deal more quickly than another form.

There are more varieties in the form of the capitals than of the small letters, but capital letters constitute a rather small percentage of what is written. Therefore, economy in writing the capital letters would not effect much economy in total writing. In the case of the small letters it would be necessary to modify the conventional form of the letters in order to gain much time. Many writers develop an individual style in which they do change the form of some of the letters a good deal from that which is considered standard. An example is found in the letter *g*. It would be profitable to study a large number of scripts

⁸Thelma G. Voorhis. *The Relative Merits of Cursive and Manuscript Writing*. (Teachers College, Columbia University: New York, 1931. 58 pp.)

⁹Harold O. Boraas. "An experimental study of the relative merits of certain written letter forms with respect to legibility, with speed and stability as related factors." *Journal of Experimental Education*, 5: 1936, 65-70.

in order to make a catalog of all the deviations from conventional form that are employed. These varieties in form could then be studied in order to estimate whether they seriously impair the legibility of the letter and whether they effect an appreciable economy in time and energy.

It might, of course, be possible to go farther and attempt to invent new letter forms or even new word signs. Eventually it may be possible to do this. For the present it is probably better to attack the problem on a more moderate scale. If convincing evidence could be produced that the modifications actually made are advantageous, this information might be used to break down the rigid standard of conventionality that is commonly enforced in the schools. The attainment of greater economy by the investigation of desirable modifications in the form of letters and words may very well be the next step in the scientific study of the problem of handwriting.

CHAPTER VII

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: READING

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The scientific study of reading began in the psychological laboratories of Europe about the middle of the nineteenth century and increased slowly but steadily for several decades. The first studies were not inspired by the desire to improve the teaching of reading, as is often assumed—that motive developed later—but mainly by sheer intellectual curiosity concerning such matters as the behavior of the eye in reading and the nature of the perceptual processes involved. Because of their intimate relation to subsequent developments in the scientific study of reading problems, the nature and unique contributions of these early investigations will be considered briefly.

I. NATURE AND SIGNIFICANCE OF EARLY EUROPEAN STUDIES¹

By 1850 studies of the perceptual processes in reading were in progress in Europe under the direction of Valentius, who concluded that a reader perceives from one to three letters in from one to three tenths of a second and that each letter is perceived separately. By 1886 Cattell's extensive studies began to appear. On the basis of experiments in which letters, phrases, and sentences were exposed, he concluded that ordinary reading proceeds by words, and frequently, indeed, by phrases and sentences, rather than by letters. These conclusions were later confirmed by Erdmann and Dodge, who showed also that words may be recognized at times even when individual letters are too small to be identified. The experiments of Goldscheider and

¹ For a full account, see Edmund Burke Huey. *The Psychology and Pedagogy of Reading*. Chapters II, III, and IV. (The Macmillan Company: New York, 1912)

Mueller followed shortly, supplying evidence that reading takes place not solely by either letters or word wholes, but rather by phrases, words, or letters, according to the reader's familiarity with the reading matter and the difficulties he encounters. Thus, step by step, significant facts were unearthed concerning the nature of perception and a clearer understanding was secured of basic habits of recognition.

While these studies of perception were going forward, certain investigators became keenly interested in the behavior of the eye in reading. About 1879, Javal discovered that eye-movements are discontinuous, a series of alternate movements and pauses. This significant discovery directed the attention of investigators to studies of the nature, function, and relation of eye-movements and fixations. The findings of the various psychologists differed widely, which suggested the possibility of individual differences in reading as well as differences due to the nature and difficulty of the material read. Thus the foundation was laid for more intensive studies during later years of the behavior of the eye in reading and of the factors that influence reading habits.

The types of studies to which reference has been made resulted in at least three significant contributions: first, the facts secured afforded new insights into both the mental and the physical processes involved in reading; second, the broader understanding of reading thus secured soon led to the discovery of new issues and in America stimulated keen interest in the scientific study of reading problems; third, rapid progress was made in the development of experimental techniques and mechanical devices for securing accurate data relating to reading habits and processes. For example, the work of Lamare and Javal at the University of Paris and of Ahrens at the University of Rostock on devices for studying eye-movements paved the way for work in American laboratories and led ultimately to highly refined methods of photographing eye-movements.

II. GROWTH OF INTEREST IN THE SCIENTIFIC STUDY OF READING

Stimulated by the results of studies abroad, investigators began, during the latter part of the nineteenth century, to participate in the scientific study of reading. Growth in interest was slow at first; in fact, the results of fewer than ten such studies were published prior to 1895. During the next fifteen years, an average of slightly more than one study of reading was published yearly. Since 1910, interest in the scientific study of reading problems has increased surprisingly. From

1911 to 1915, for example, 49 studies were published; during the next four five-year periods, the corresponding numbers were 151, 273, 490, and 534. As the number of investigations increased, the scope of the problems attacked became broader. This development can be readily illustrated by brief reference to types of problems studied at various times during the last fifty years.

1. The Early Period (1884-1910)

The first study of the early period (1884-1910) concerned the rate of adult reading. Of the remaining thirty-three investigations published before 1911, more than half were laboratory studies relating to the psychology and physiology of reading. This is not surprising, however, when it is recalled that laboratory studies had been pursued vigorously during the preceding years in continental Europe. In fact, the reports of studies in this country clearly recognized their relation and indebtedness to various investigations in Germany and France.

Other problems studied during this period related to children's interests in reading, vocabulary mastery, rhythm in oral reading, and the historical development of reading materials for school use. There were a few classroom studies, but most of the major contributions came from educational psychologists interested in laboratory studies of reading.

Two important results of these investigations form the basis of many present-day reforms in reading; namely, the clear-cut distinction between oral and silent reading and the recognition of individual differences in reading interests and habits.

2. The Transition Period (1911-1920)

The period from 1911 to 1920 may be characterized as one of transition. Between 1910 and 1913, most of the studies related to such problems as methods of learning to read, the relative merits of different methods of teaching primary reading, the need of phonetics, the course of study, and the amount and quality of the reading in different schools and grades. The explanation of this wide interest in classroom problems is found in two facts: first, the increasing importance attached to silent reading stimulated an inquiring attitude toward reading problems among teachers; and second, the results of studies made in the early period challenged the validity of traditional methods of teaching reading and suggested numerous practical problems for investigation.

A second circumstance underlying the transitional period from 1911 to 1920 was the introduction of new instruments of investigation. During 1914 and 1915 two-thirds of the studies reported dealt with the organization, standardization, and application of silent-reading tests. Through their use it was now possible to study, under classroom conditions, the reading achievements and needs of large groups of pupils. As a result, studies were undertaken on a scale that had been impossible through the use of laboratory techniques. By the end of 1920, educational psychologists, school surveyors, and teachers were carrying on intensive studies of reading achievement, comparing progress in oral and silent reading, studying the relative value, economy, and efficiency of the two types of reading, determining the factors associated with growth in different phases of reading, identifying the errors and difficulties of individual children, and measuring the progress of children taught by different methods. While such studies were in progress, laboratory techniques were also greatly improved and the number and significance of the laboratory studies increased notably. However, the relatively greater prominence of classroom studies was due to the inquiring attitude concerning reading problems stimulated by the results of earlier studies and to the development of instruments of measurement that could be applied in the study of a wide range of classroom problems.

3. The Modern Period of Intensive Scientific Study (1921-)

The period from 1921 to the present may be characterized as one of unprecedented interest in the scientific study of reading problems. The basis of this interest has already been explained. During the last two decades, reading laboratories have been established in an uncommon number of higher institutions, and every encouragement has been given to staff members of progressive school systems to make use of scientific methods in the study and improvement of reading instruction. The broad range of issues studied is suggested by the following list of topics: the social significance of different types of reading, purposes of reading involved in study situations, methods of learning to read, the relative value of different methods of teaching pupils to read, the nature and development of fundamental reading habits, the relation between language mastery and grasp of meaning in reading, the difference between good and poor readers, provision for individual differences, methods of developing a meaning vocabulary and of increasing

comprehension and interpretation, the causes of reading disability, the relative merits of different remedial procedures, the hygiene of reading, the factors that contribute to the readability of books, the kinds of books that appeal to the interests of children at different levels of advancement, the factors and conditions that contribute to reading readiness, the causes of poor reading habits among high-school and college students, how to stimulate desirable reading interests at all levels, the reading habits of adults, the relation of reading ability to the development of personality, and improved methods of measuring reading achievement and needs.

This list merely illustrates the wide range and great variety of reading problems under investigation. With the solution of each problem has come the discovery of new issues. This has led in turn to the development and refinement of new instruments of measurement and new techniques of investigation. A great stimulus to additional studies of reading has been the recognition by psychologists and teachers of the unquestioned value of scientific studies in increasing our understanding of the nature of reading, in improving the teaching of reading at all levels, and in promoting its value as a means of intellectual and social progress.

III. THE VALUE OF THE SCIENTIFIC STUDY OF READING²

The value of the scientific study of reading problems can be appreciated by reviewing the notable progress made during recent years in understanding various phases of reading and in modifying teaching procedures. One field only has been selected for purposes of illustration here; namely, the nature of reading and the various processes involved.

Brief reference has already been made to the early studies of perception and eye-movements that led to a clearer understanding of the basic habits of recognition, the behavior of the eyes in reading, the distinction between oral and silent reading, and individual differences in reading habits. As soon as significant differences between oral and silent reading were recognized, investigators began intensive studies

² The reader who wishes to extend his knowledge of the contributions of scientific study to the problems of reading beyond what can be outlined in this chapter is referred to the *Second Report on Reading* (Thirty-Sixth Yearbook, Part II, of this Society, 1936), wherein the author of this chapter presented the contributions of the Society's Committee on Reading, of which he was the chairman.
—Editor.

of each. Thus, in oral reading Buswell³ investigated the eye-voice span; that is, the distance that the eye precedes the voice in reading. The work of Buswell and succeeding investigators showed that oral reading is a far more complicated process than silent reading and that a reasonable degree of efficiency in the latter is essential before one can read aloud at sight fluently and with appropriate expression.

Paralleling special studies of oral reading, numerous investigations have been made of silent reading. Early studies in this field dealt with two clearly distinguishable phases of silent reading; namely, speed and comprehension. Through the use of tests and eye-movement records, it was found that rates of silent reading vary widely among individuals, and that the ability of a reader can be most accurately described, not in terms of a single rate, but rather in terms of different rates that vary with the kind of material, its difficulty, the purpose of reading, and other conditions under which the reading is done.

These facts indicate that the problem of establishing efficient habits of speed in reading is by no means simple. It is complicated by two assumptions that are amply justified by investigation. The first assumption is that in final analysis speed of reading is determined primarily, not by the rate at which stimuli from the printed page reach the appropriate brain centers, but rather by the rate at which the ideas presented are apprehended. The second assumption is that the capacity of individuals to comprehend and to interpret differs widely. These assumptions—or better, facts—justify the conclusion that we should not expect or even strive for uniform achievement with respect to speed of reading among either children or adults. Similarly, a teacher should urge a given individual to read only as rapidly as he can read well for the particular purpose in hand. As a result of research on this aspect of reading, instruction in reading has recently been so modified as to avoid the excessive emphasis on speed, current during the past two decades, and to provide more discriminating guidance for individual pupils.

As to comprehension, the problems have proved even more challenging. The varied nature of comprehension has been emphasized by the wide variety of objective tests that have been used in measuring it; in fact, there is ample evidence that the term is now too loosely used. The

³Guy Thomas Buswell. *An Experimental Study of the Eye-Voice Span in Reading*. (Supplementary Educational Monographs, No. 17. Department of Education, University of Chicago, 1920. 106 pp.)

nature of the mental processes involved has been considered by various psychologists. Thorndike,⁴ for example, after an extended study of children's reading, came to the conclusion that comprehension is an elaborate process and involves "the same sort of organization and analytical action of ideas as occur in thinking of supposedly higher sorts."

Our understanding of the nature of comprehension has been further extended by studies of the relation to it of selected abilities. For example, the correlation between comprehension and the combined effect of general intelligence, vocabulary mastery, and ability to organize ideas is, according to Hilliard⁵ and others, very high. This conclusion supports that of psychologists that the general capacity of an individual to deal intellectually with ideas, his stock of concepts and breadth of experience as presented by his meaning vocabulary, and his capacity to sense relationships determine to a large degree his ability to comprehend what he reads.

The highly complex nature of the reading act has been further demonstrated in studies by Judd and Buswell⁶ of the mental processes involved in reading different types of material and in reading for different purposes. Their data show that the reading act differs significantly with such variants and that the printed page provides a mass of impressions that the mind of the reader begins to organize and arrange according to some pattern, plan, or purpose. To put the matter in other words, intelligent reading involves various patterns of mental activity depending upon the nature of the ideas presented, the kinds of relations involved, and the specific purpose of reading on given occasions. These outcomes suggest the need of more detailed information concerning the kinds of thinking that accompany the act of reading and the need of more carefully guiding the pupil when he is learning to read different types of material and for different purposes. Only as definite progress is made in the solution of such problems can the instruction provided in classrooms be markedly improved.

⁴ Edward L. Thorndike. "Reading as reasoning: a study of mistakes in paragraph reading." *Journal of Educational Psychology*, 8: June, 1917, 331.

⁵ George Horatio Hilliard. *Probable Types of Difficulties Underlying Most Skills in Comprehensive Tests*. (University of Iowa Studies in Education, Vol. 2, No. 6. Iowa City, Iowa, 1924. 60 pp.)

⁶ Charles H. Judd and Guy Thomas Buswell. *Silent Reading: A Study of the Various Types*. (Supplementary Educational Monograph, No. 23. Department of Education, University of Chicago, 1922. 160 pp.)

IV. CONCLUSION

The foregoing presentation shows that over a period of several decades research has made impressive contributions to our understanding of the nature of reading and the basic processes involved. As a result of the rapid increase in the social significance of reading and of the new insights provided through early studies, research has extended rapidly until it now involves practically every important phase of reading. Each step of progress has been marked by the discovery of new problems and issues even more provocative than those previously attacked. Thus the scientific study of reading problems has not only increased understanding, but has also extended the frontiers and identified additional problems for investigation.

Furthermore, the results of research have modified to a notable degree the organization, content, and methods of teaching reading. Such reports as the *Thirty-Sixth Yearbook, Part I*, of this Society supply convincing evidence of such trends. As the place of reading in the curriculum has expanded, new problems requiring investigation have been identified. Thus research and classroom practice have been mutually stimulating, each profiting from the progress and contributions of the other. Only through continuous and whole-hearted coöperation on the part of all agencies interested in reading problems can we hope to attain an adequate solution of both the practical and the theoretical issues that we face today.

CHAPTER VIII

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: SPELLING

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Research in spelling has not only exerted enormous influence upon the teaching of that subject; it has also contributed materially to the refinement of theory and methods of investigation in other curricular fields. Because of its relative simplicity and objectivity, because the units are small and well defined, because the standards of current usage are established, and because the data are more nearly complete, a review of research in spelling affords an excellent introduction to the scientific study of instructional problems.

Research in spelling has been directed to the solution of four main problems: (1) the discovery of words most frequently written by adults; (2) the content, arrangement, and sequence of the curriculum by grades; (3) the determination of effective methods of teaching; and (4) the measurement of results. The data bearing on these four problems are perhaps more nearly complete for spelling than for any other subject, and there is probably no other subject in which practice has been so fully shaped on the basis of evidence. These problems cannot be systematically treated here, even in outline, but examples may be chosen that illustrate the methods by which they have been investigated.

I. WORDS MOST FREQUENTLY WRITTEN BY ADULTS

Although earlier investigations had been made, the publication by Ayres of "The Spelling Vocabulary of Personal and Business Letters" may be said to have directed the attention of students of education to the scientific study of the content of the curriculum in spelling. Ayres, like most of the investigators who have followed him, made two assumptions: first, that the spelling curriculum should contain the words

that are most important in life outside the school, and second, that the relative importance of these words should be determined not by opinion but by actual count. In the case of spelling, both the definition of social utility and the technique of its analysis are, as compared with other curricular fields, relatively elementary and straightforward. But they are not so simple as might at first appear. In the first place, it is difficult to obtain adequate samples of adult writing. Certain types of highly personal letters, for example, are hard to secure, and many business firms are unwilling to give access to their files. In the second place, the usefulness of words for purposes of spelling instruction is determined not by one criterion but by many, the most important of which are frequency of use, spread in the various types of writing, universality, as measured by geographical distribution, permanence, difficulty, quality, and cruciality. No one of these criteria can be neglected in determining what words should be included in the spelling curriculum. The criteria, moreover, are interrelated in many significant ways.

Extensive data have been collected under the guidance of each of these criteria.¹ The significance of the data in each instance is dependent upon the importance of the criterion, the soundness of the decisions as to the types of writing that should be sampled, the adequacy of the samplings, and the interpretation of the data. For example, the assumption has been made that the most feasible measure of the quality of words used in writing is provided by the examination of the writing of people of more than average literary ability. The decisions as to what writers to choose and as to the nature and the quality of the samples taken have been determined in part by subjective judgment and in part by the availability of the letters of gifted writers. From the sources chosen, over 700,000 running words have been analyzed. The adequacy of the resulting list of words, with their accompanying frequencies, may be evaluated from four points of view: the soundness of the general hypothesis, the selection of the sources, the nature and extent of the samplings, and the treatment of the data.

Although the samplings of data on some of these criteria are not

¹ For a description and evaluation of the data on all the items excepting permanence and difficulty, see Ernest Horn, *A Basic Writing Vocabulary*. (University of Iowa Monographs in Education No. 4; State University of Iowa, Iowa City, 1926). The most important published data on difficulty are provided by the various standard spelling scales. The data on permanence are in part from unpublished studies and in part from the historical treatment of words in the *New English Dictionary*.

so extensive as they should be, their usefulness, both for practical and theoretical considerations, goes far beyond anything that opinion could provide. It is no easy matter, however, to decide what the proper weight of each of the criteria should be in determining the words that are most important in the writing of adults. It is clearly impossible to combine them satisfactorily in a purely mechanical way, either on the basis of the raw data or on the basis of any system of weightings that can be devised. Subjective judgments enter in many ways. Data do not select, evaluate, and organize themselves.

The existing data enable us to make, with a good deal of confidence, practical decisions in curriculum-making. The consistency with which three or four thousand words appear in various types of writing, in various geographical localities, and in various periods of time is impressive. It is significant also that, with few exceptions, the words used frequently in writing are also reported with high frequency among the words most frequently used in reading.

Additional evidence of the validity and reliability of these data is afforded by investigations of other languages. A comparative study of the data from vocabulary counts in English, French, German, and Italian suggests that basic experiences, needs, and interests are pretty much the same in all these countries. Indeed, a French vocabulary list made by translating the words most frequently written and read in English² was largely substantiated by the actual word counts in French later made by the Modern Language Association, in spite of the limitations of translation of individual words due to variations in the semantic varieties of words in the two languages. The basic writing needs in the case of English, as far as the spelling vocabulary is concerned, are met by the words of high frequency in available lists.

Available data bear out James Murray's statement that the English language "has a well-defined centre but no discernible circumference." Near the center, say among the first five hundred or thousand words, the data appear to be both valid and reliable. As one moves from the center, the data are less dependable. Yet they enable us to establish, with very small probability of error, a basic vocabulary as large as that which the school now attempts to teach. Whether the number of words commonly included in the curriculum is more than or is less than it should be, and what the margin of utility is in the spelling vo-

² Charles F. Ward. *Minimum French Vocabulary Test Book*. (The Macmillan Company: New York, 1926)

cabulary cannot be decided until other educational values have been put in order of usefulness, and for no subject other than spelling has this been seriously attempted.

The foregoing statements are not intended to imply that there is no room for further investigations in the determination of the most important words in writing. Some of the hypotheses that have guided research in the past have been criticized, and limitations, both qualitative and quantitative, are well recognized by the investigators themselves. The way to remedy these defects is, of course, to collect better data and more of them. For the reasons given, it seems unlikely that additional counts would bring about great change in the basic spelling list, except in the case of words of marginal value. But they would refine and expand present knowledge and enable us to answer a great many interesting theoretical problems.

There has been a great deal of rather meaningless tabulation of lists in spelling. Perhaps the worst examples are those in which large numbers of word lists are thrown together with little or no consideration of the nature, validity, or reliability of the data back of the individual list, and without competent knowledge or interpretation of existing data. The result has been to confuse real issues and to discourage original investigations that would expand and refine our present knowledge.

II. THE CONTENT, ARRANGEMENT, AND SEQUENCE OF THE CURRICULUM BY GRADES

The ability to spell the words that are most important in adult writing may be taken as the end-point of spelling instruction in the school. What the content, organization, and sequence of the curriculum in spelling should be for each grade is another problem. Among the criteria suggested for the solution of this problem are: (a) use in the present writing by children, (b) the relative importance of the words as measured by their permanent value, (c) the difficulty of the words, and (d) their logical sequence. All these must be given serious consideration.³ In recent years, however, the greatest emphasis has been placed upon the first criterion, the present writing needs of children. Various studies have been made of words that children use most fre-

³ Thomas G. Foran. *The Psychology and Teaching of Spelling*. Chap. III. (The Catholic Education Press: Washington, D. C., 1934)

Frederick S. Breed. *How to Teach Spelling*. (F. A. Owen Publishing Company: Dansville, New York, 1930)

quently in writing.⁴ Here, as in the case of adult writing, the value of the data depends upon the soundness of the hypotheses as to what types of writing should be tabulated and upon the quality and extent of the samplings and the interpretation of the resulting data. In all these aspects, most of the best-known investigations of the writing vocabulary of children are seriously deficient. In many, the assumption has been made that the writing done under the stimulation or requirements of the school constitutes the writing needs of children. Yet many of these requirements are arbitrary, artificial, and unwise. There is no legerdemain of research by which the words that children *do* need to write can be validly determined from an analysis of writing that children *do not* need to do, except for the arbitrary and too often mistaken requirements of the school. In some of the best-known investigations, moreover, samplings have not been distributed according to any pattern, nor have the frequencies been kept, so that it is impossible to assign relative values to the various words reported even for the criterion of frequency alone. The studies of the writing that children do in life outside the school have been more carefully made, but the samplings have not been nearly so extensive or so well distributed as those made for adult writing.⁵ More refined and more extensive investigations are needed to establish the relative frequency of words in the writing vocabulary of children at each grade level. It is clear, however, from existing data: first, that the vocabularies of children are much larger than has been assumed; and second, that at any age after children begin to write, the overlap between the words they use and those used by adults is very extensive. The evidence points to the probability that when the writing needs of children at each grade level have been as adequately determined as have the writing needs of adults, more words will be found that are at once of immediate and of permanent value than can be taught in the first six grades.

The mere selection of the words to be taught in a given grade is but

⁴For a description and evaluation of such studies up to the year 1925, see the *Third Yearbook*, Department of Superintendence, Washington, D. C., 1925, Chap. IV.

⁵James A. Fitzgerald. *Letters Written Outside the School by Children of the Fourth, Fifth, and Sixth Grades: A Study of Vocabulary, Spelling Errors, and Situations*, pp. 1-50. (University of Iowa Studies in Education, Vol. IX, No. 1, State University of Iowa, Iowa City, 1934)

Paul McKee. Unpublished study of words used by children in writing letters outside the school.

one of the problems that must be met in the proper arrangement of the course of study in that grade. The organization and sequence of lessons must be determined. There are also additional problems, such as the relation of spelling to other curricular fields, which are closely related to methods of teaching. In general, it may be said that little progress has been made in determining, by investigation, the internal arrangement of the course of study within a grade or in determining the relative influence of various other factors, such as incidental use in other subjects, relative difficulty of the words, and logical sequence.

III. METHODS OF TEACHING

Words and word-like forms have long been used as materials for learning experiments in psychology. From these experiments substantial data have been provided on such matters as imagery, relation of impression to recall, and curves of learning and forgetting.⁶ In general, the findings of the psychologists have been substantiated by direct experimentation in the learning of spelling itself. As the result of direct experimentation in spelling and the supporting evidence from psychology, fairly satisfactory methods have been formulated; nevertheless, there is still need for more refined knowledge of many factors, such as motivation, incidental learning, overlearning, the distribution of learning, and the application of such rational principles as are found in English spelling. The determination of the effect of various types of motivation is an especially troublesome but promising field of investigation.

It must be admitted that much of the research on problems of learning has been superficial rather than fundamental, because of inadequate training in psychology, in phonetics, and in the principles of orthography, as well as because of other shortcomings in the statistical and experimental methods.

IV. TESTS

Research in testing in spelling has been devoted to two closely related goals: the measurement of rather vaguely defined spelling ability and the measurement of achievement. The raw data for the construction of spelling tests or scales have been obtained by a tabulation of the attempts of large numbers of children at different grade levels to spell each of a list of words. From these data spelling scales have been

⁶ For a review of these experiments, see the *Eighteenth Yearbook*, Part I, of this Society, 1919, Sec. III.

built up that provide standards for various grades in school, beginning with Grade II. Since it is impossible to know whether or not any given child had previously studied any word, either systematically in the spelling class or otherwise, one cannot say with assurance what is the relative part played by the inherent difficulty of a word and the amount of learning that has been devoted to it. Our knowledge of the actual learning difficulty of words is very fragmentary and can be deduced only indirectly and to a limited extent from the present scale values.

Not only are these limitations of spelling scales not generally recognized, but the scales or tests are also often improperly used. The assumption is frequently made that the spelling achievement in a given year can be measured by a test sampled from a standard spelling scale, without reference to the course of study in the schools tested. This cannot be justified, since the way to determine the degree to which a given series of lessons has been learned is through a test constructed on the basis of the content of these lessons. One cannot assume that it is possible to measure the success with which one list of words has been learned by giving a test made up of other words.

A step forward would be to provide separate values for words before and after systematic teaching. If such data were provided for the five thousand most useful words, it would be a relatively easy matter for any teacher or school system to utilize the data in constructing tests more pertinent to the instructional program.

Spelling achievement and spelling ability are obviously closely related, and it seems probable that spelling ability, irrespective of the ability to spell words studied systematically in a given period, may be indicated to some extent by our present spelling scales. While promising beginnings have been made in the discovery and definition of the factors that enter into spelling ability, the results are fragmentary and somewhat inconclusive. There is no theoretical reason why substantial improvements to our knowledge in this field should not be made through adequate experimentation. Many other problems in testing are amenable to research attack: the influence of tests upon instruction, the use of tests in supervision, and many problems of administration, such as the form of the test, its validity, and its reliability.

V. SIMPLIFIED SPELLING

An interesting example of faulty hypotheses is shown in the persistent interest, both among laymen and among members of the teach-

ing profession, in simplified spelling. The naïve demand that words should be spelled as they sound reflects ignorance of the fact that there are more sounds in the English language than there are letters and that letters express more than one sound. Furthermore, it ignores the fact that for a considerable proportion of our words there is more than one 'accepted' pronunciation; as, for example, in Edinburgh, Scotland; in Cambridge, England; in Boston, in Chicago, and in New Orleans.

But perhaps the most serious error that has been committed, even by groups of scholars, is the failure to make adequate statistical counts as the basis for recommended reforms. Many deficiencies grow out of this failure. A glaring example is the inclusion, in a restricted list recommended for simplification, of words, like *decatalogue* (decalog), so rarely written that the simplification of the spelling is of little consequence. There has been no serious attempt, moreover, to determine by experiment what the effect of proposed simplifications would be upon learning to spell.

VI. SUMMARY AND CONCLUSION

The preceding paragraphs have attempted to make clear that defects in our knowledge of the teaching of spelling are due partly to erroneous or inadequate hypotheses and partly to faults in the procedures set up under the guidance of these hypotheses. Both of these defects are heightened by a lack of scholarly knowledge of spelling itself. A knowledge of the principles of orthography, of that part of phonetics that pertains to the relation between sounds and printed symbols, and of the history of the language is especially important.⁷ Research in the improvement of instruction in spelling, like that in the improvement of instruction in all subjects, is heavily dependent upon a scholarly grasp of the subject matter itself.

⁷ An easily available reference is the introduction to Webster's *New International Dictionary*. See also the introduction to *A New English Dictionary*, James A. H. Murray (Ed.). (Clarendon Press: Oxford); and also George H. McKnight. *Modern English in the Making*. (D. Appleton-Century Company: New York, 1928)

CHAPTER IX

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: ENGLISH USAGE

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In the last third of a century the teaching of English has been affected by a number of characteristic trends in content and method that obviously are the results of research. Instruction in English, once highly formal and disciplinary, has become much more functional and practical. Emphasis on error counts and the correction of error is gradually giving away to a constructive program for the establishment of correct language habits at the outset. The psychology of learning has become more practical; the objective of instruction more typical of life. Certain of these important trends are recognized here as the results of important areas of research and provide the basis for the general organization of this section.

I. GRAMMAR AS A MENTAL DISCIPLINE

Near the beginning of this century, research in English was stimulated by a general interest in the experimental evaluation of formal discipline. In a study of grammar as mental discipline, results from tests in grammar, composition, and literary interpretation supported the conclusion that "there is about the same relationship existing between grammar and composition and grammar and interpretation, as exists between any two totally different subjects, as grammar and geography."¹ Later evidence supplementing the early studies indicates that training in formal grammar does not result in significant gains in an individual's ability to write or to recognize correct English. Recently grammar has been held to contribute to the better understanding of the

¹ Franklin S. Hoyt. "The place of grammar in the elementary curriculum." *Teachers College Record*, 7: November, 1906, 467-500.

sentence. Yet the experimental evidence shows a disappointing lack of relation between sentence sense and grammatical knowledge of subjects and predicates.

The actual amount of technical grammar in textbooks has been reduced approximately fifty percent in the forty-year period ending in 1924.² In 1936 the Curriculum Commission of the National Council of Teachers of English recommended that "all teaching of grammar separate from the manipulation of sentences be discontinued . . . since every scientific attempt to prove that knowledge of grammar is useful has failed . . ."³ In spite of the fact that formal grammar as a method of teaching English usage is not supported by the experimental evidence, it still may be a highly useful editorial tool. This conception of grammar as an adult means of summarizing correct usage, rather than as a teaching method, is quite in line with the evidence and with modern practice.

II. OBJECTIVES OF INSTRUCTION

The failure of grammar to demonstrate its disciplinary value forced those interested in the teaching of English to look elsewhere for important objectives of instruction. During this period numerous attempts were made to assemble statements of the social objectives of instruction in English. Thus, in one study⁴ more than 1500 aims of English teaching were assembled from various sources and were submitted to large numbers of judges for appraisal. This resulted in a list of outcomes as evaluated by a group of experienced teachers of English. Again, in connection with the program of curricular revision at Los Angeles a list of basal objectives for language training was evaluated.⁵

Somewhat later the problem of social objectives was approached more directly by tabulating the responses of 3600 adults in twelve different occupational areas to this question: "What relative emphasis is placed upon writing, reading, and speaking in doing everyday work?"

² M. J. Stormzand and M. V. O'Shea. *How Much English Grammar?* (Warwick and York, Inc.: Baltimore, 1924)

³ W. Wilbur Hatfield (Chairman of Curriculum Commission). *An Experience Curriculum in English*. (National Council of Teachers of English, English Monograph No. 4. D. Appleton-Century Company: New York, 1935)

⁴ C. S. Pendleton. *The Social Objectives of School English*. (George Peabody College for Teachers: Nashville, Tenn., 1924)

⁵ Franklin Bobbitt. *Curriculum-Making in Los Angeles*. (Supplementary Educational Monographs, No. 20. Department of Education, University of Chicago, 1922)

This study⁶ not only revealed the relation of the written and oral language skills, but also identified in much more detail the specific types of training in English desired by workers in each of the occupational classes. Numerous other investigations in this area led to the more definite formulation of objectives in English. While these outcomes were much more specific than those afforded by the grammatical approach, they were still too vague and too general to provide an entirely adequate basis for the course of study in English.

In an effort to overcome the limitations of the use of individual opinions in setting up objectives, a method of group introspection and analysis of personal language activities was proposed.⁷ This approach resulted in the identification of these nine general types of social demand on language: (1) letters, (2) conversation, (3) group discussions, (4) formal discussions, (5) reports, (6) personal memoranda, (7) talks on special occasions, (8) directions, instructions, and explanations, and (9) story-telling. The recognition of these functional centers, which designate important areas in which English instruction should be emphasized, has done much to influence the content of the modern textbook and curriculum in English.

III. ANALYSIS OF ERROR AND USAGE

The general acceptance of the social utility theory in curricular construction stimulated a program of research designed to determine the relative social importance of certain language usages and skills. An extensive count of the language errors made by school children proved to be highly significant and indicates the trend of this type of research.⁸ Another investigation attempted to determine the relative importance of certain aspects of instruction in English through an elaborate analysis of many different types of written products.⁹ Undoubtedly this study did much to draw attention to the need for instruction based upon a more functional type of grammar.

⁶ J. W. Searson. "Determining a language program." *English Journal*, 13: February, 1924, 99-114.

⁷ Roy Ivan Johnson. *English Expression: A Study in Curriculum-Building*. (Public School Publishing Company: Bloomington, Illinois, 1926)

⁸ W. W. Charters and Edith Miller. *A Course of Study in Grammar Based upon the Grammatical Errors of School Children of Kansas City, Missouri*. (University of Missouri Bulletin, Vol. 16, No. 2. Education Series No. 9, Columbia, Mo., 1915)

⁹ M. J. Stormzand and M. V. O'Shea. *Op. cit.*

Studies of error furnish a somewhat biased picture of the curriculum. Such an approach tends to give too much emphasis to the corrective, and too little to the constructive, aspects of English usage. Error studies may afford a helpful index to the relative amounts of drill that should be given to different items of instruction, but they are not an adequate basis for determining curricular importance. Furthermore, later experimental evidence on the accuracy of such records of oral language has cast some doubt upon the reliability of the error counts.¹⁰

IV. STANDARDS OF USAGE

In recent years a number of significant contributions have been made to the problem of what constitutes acceptable current usage. In one of the earlier studies of the usage of cultivated persons it was found that many expressions usually condemned in English textbooks were acceptable and were classed as *cultivated English* by three-fourths of a jury of linguists.¹¹ A later study, undertaken in coöperation with the National Council of Teachers of English, secured a significant cross-section of the reactions of teachers, writers, and editors to certain questionable usages both in diction and in the mechanics of writing.¹²

The rapidity with which certain forms of expression change in social acceptability was shown in a recent study.¹³ In an effort to set up a partial antidote for the apparent decline in standards of social usage in language, it has been suggested that some types of objective criteria representing relatively high levels of control over these usages are desirable.

V. EMPHASIS ON ORAL ENGLISH

During this period the emphasis on the social objectives of English called attention definitely to the discrepancy between the social demands and the instructional emphasis upon abilities in written and

¹⁰ E. A. Betts. *An Evaluation of Certain Techniques for the Study of Oral Composition*. (Studies in Education, Vol. IX, No. 2. University of Iowa: Iowa City, 1934)

¹¹ S. A. Leonard and H. Y. Moffett. "Current definition of levels in English usage." *English Journal*, 16: May, 1927, 345-359.

¹² S. A. Leonard. *Current English Usage*. (The National Council of Teachers of English: Chicago, 211 West 68th Street, 1932)

¹³ Robert C. Pooley. *A Handbook of Current English Usage*. Greeley: Colorado State Teachers College Bulletin; Greeley, Colo., No. 3, Series XXX, June, 1930)

abilities in oral English. The recent development of portable electric recording equipment has made it possible to secure verbatim records of all types of oral language activities.¹⁴ By means of this apparatus hundreds of thousands of running words of oral English have been recorded and analyzed as the basis for needed readjustment of the curriculum in English.¹⁵ Much more intensive work on the use of English in speech has also been stimulated by this approach.¹⁶

VI. METHODS OF TEACHING

The failure of early investigations to establish the efficiency of grammar as an adequate method of teaching English usage resulted in an increased emphasis on the so-called 'functional skills.' This tendency seems to be directly in line with the most recent experimental evidence.

The most acceptable psychology of learning indicates that linguistic usages and skills are acquired most effectively and permanently through extensive and repeated exercise in relatively natural settings. In one experiment in which work in English was presented as an activity,¹⁷ the pupils showed more improvement in expression, applied their knowledge of English skills more widely in other fields, and generally showed themselves superior to the control group taught by traditional methods. In specific skills, such as letter-writing, the social situation is much more effective in fixing the desired skills than the artificial situation is.¹⁸ Drills based upon pupils' own individual types of errors are more effective than general drills. The use of dictation exercises has been found to be a very effective way of developing certain of the more mechanical skills in language, as in spelling, punctuation, capitalization, and letter form.

Teachers of English with large classes, heavy schedules, and endless

¹⁴ H. A. Greene and E. A. Betts. "A new technique for the study of oral language activities." *Elementary School Journal*, 33: June, 1933, 753-761.

¹⁵ T. K. Goltry. "An Analysis of Sentence Structure in Oral Composition." (Unpublished doctor's dissertation, State University of Iowa, 1935)

¹⁶ William Cabell Greet. "Phonographic expedition to Williamsburg, Virginia." *American Speech*, 6: February, 1932, 161-172.

¹⁷ Louis G. Boeh. "The Practicability of an Activity Program in English in the Upper Elementary Grades of a Departmental School." (Master's thesis, University of Cincinnati, 1933)

¹⁸ Phila S. Humphreys. "Artificial versus Social Situations in Teaching Letter Writing." (Master's thesis, University of Chicago, 1933)

theme-reading should be appreciative of the conclusion of an experimental study in methods.¹⁹ According to this study the teacher can no longer feel confident that the critical reading and correction of pupils' themes, followed by the rewriting of the themes by the pupils, will result in the effective elimination of error. In general, systematic practice on the actual errors made by the pupils is likely to be much more effective.²⁰

VII. MEASUREMENT OF ENGLISH ABILITIES

Recent tendencies indicate a general improvement in the quality of measuring instruments in language, although relatively little has been done to increase the efficiency of the various types of written composition scales. Little or no progress in the measurement of oral composition abilities is reported in the literature. In a very recent study the experimental use of three new types of scales for the measurement of oral compositions is described.²¹

Considerable attention has been given to research in the improvement of testing techniques. Numerous checks of thousands of running words of theme material written by school children lead to the conclusion that such extensive samplings are required for reliable measurement that as a diagnostic technique the method is impractical. A proof-reading technique for language diagnosis has been validated.²² An experimental validation of eleven different types of tests designed to provide an analytical cross-section of language achievement demonstrated the efficiency of this type of testing.²³ Recently much emphasis

¹⁹ J. E. Fellows. *The Influence of Theme-Reading and Theme-Correction on Eliminating Technical Errors in Written Composition*. (University of Iowa Studies in Education, Vol. VII, Number 1. University of Iowa: Iowa City, March 1, 1932)

²⁰ J. E. Thomas. *The Elimination of Technical Errors in Written Composition through Formal Drill*. (Studies in Education, Vol. VIII, Number 2. University of Iowa: Iowa City, October, 1932)

²¹ R. F. Netzer. "An Evaluation of Certain Materials as Stimuli for Oral Language." (Unpublished master's thesis, University of Iowa: Iowa City, 1935)

²² John C. Reno. "A Critical Study of Two Types of Objective Tests for Measurement in English Mechanics." (Unpublished master's thesis, University of Iowa: Iowa City, 1929)

G. M. Wilson. "Language error tests." *Journal of Educational Psychology*, 21: December, 1920, 290-296.

²³ H. L. Ballenger. *The Validation of the Iowa Elementary Language Tests*. (Studies in Education, Vol. VI, No. 3. University of Iowa: Iowa City, 1931)

has been placed upon the improvement of the scoring techniques for language tests. In the 1937 edition of *Iowa Every-Pupil Tests of Basic Skills*²⁴ a novel type of stencil scoring key was presented that greatly increased the efficiency of scoring and effectively controlled the distribution of skills measured. The use of such devices makes possible the preparation of a language test that more closely resembles a real language situation. It is impossible to forecast the effect of such devices as the new mechanical scoring machines on the nature and the content of language tests.

VIII. TECHNIQUES OF RESEARCH

Work on the oral aspects of English in the curriculum has been severely handicapped in the past by the fact that complete and accurate records of oral language activities could not be secured. An important contribution to research in English is the development, already mentioned, of equipment for the electrical recording of oral language that makes it possible to use the error-quotient technique, with its resultant emphasis on the total language picture, rather than on error only.

Another modern technique in English research is the use of equipment for mechanical tabulation. In a partially completed and unpublished investigation the writer of this chapter is using such equipment. Over a million and a half running words of written composition of school children in Grades IV to IX have been placed on tabulating cards and are being coded for analysis. In its complete form this investigation promises to reveal some very significant information concerning the social burden carried by all variants of certain usages in English. Apparently, the application of this technique to other types of analysis of English usage is entirely feasible.

²⁴ E. F. Lindquist (General Editor). *Iowa Every-Pupil Tests of Basic Skills*. Bureau of Educational Research and Service, University of Iowa: Iowa City, 1937)

CHAPTER X

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: MATHEMATICS¹

I

CONTRIBUTIONS TO ELEMENTARY-SCHOOL MATHEMATICS

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Researches dealing with arithmetic were few prior to 1900. While this section is concerned only with the influences of research, a brief consideration of the status of arithmetic at that time will serve as a useful basis of comparison.

I. THE STATUS OF ARITHMETIC IN 1900

The arithmetic program in the elementary school underwent great expansion during the latter half of the nineteenth century. In fact, in a considerable number of schools as much as half of the total school day was devoted to this subject. Criticism of the excessive amount of time given to arithmetic began to take form by the year 1890, and in both the reports of the Committee of Ten and of the Committee of Fifteen, in 1893 and 1895 respectively, emphasis was given to the need for reducing the amount of time consumed by this subject. In the attempt to reduce the burden of arithmetic, some apparently unimportant topics were eliminated from the program of study. As this process of eliminating topics proceeded, it became clear that some basic principle for reducing the content of the subject was needed. The search for such a basic principle to determine the content of the arithmetic course of study gave rise to a whole series of researches that, from 1910 to 1930, had a pronounced influence upon the teaching of arithmetic.

¹Chapter X is presented in two sections: Section I on Elementary-School Mathematics by Professor Buswell, and Section II on Secondary-School Mathematics, by Professor Breslich.—*Editor*.

II. RESEARCH IN THE FIELD OF SOCIAL UTILITY:

THE 'REDUCTIONISTS'

At first, the principle of social utility was applied in purely negative fashion. Topics that were not socially useful were eliminated from the program. In order to discover what was not needed, careful investigations were made of the arithmetic used by various groups, such as bank clerks, department-store salespeople, and farmers' wives. Later, the studies were extended to cover the arithmetical activities of children to show the amount of arithmetic used in play as well as in various school activities. The total number of research studies of this type was large, and the net result was the finding that much that was taught in the course of study in arithmetic did not appear in the actual computational activities of the groups investigated. Consequently, course-of-study committees were advised to eliminate many topics from the program of arithmetic and to reduce the scope of topics retained. While at the beginning the eliminations were mostly useless social processes, the later results dealt primarily with actual number operations. Guided by this research, textbook-writers eliminated long addends in addition, fractions with large denominators, decimals beyond a certain number of places, and some entire processes that were found not to occur frequently. The influence of this kind of research reached its peak when one enterprising graduate student argued in his doctor's thesis that eighty-five percent of all arithmetic taught in the schools was useless.

Such extravagant statements as that one produced two significant results. In the first place, critics of the social utility type of research pointed out that the principle had been applied too narrowly and that computational ability was not the only criterion that should be applied to the results of arithmetic. It was pointed out that quantitative thinking as an outcome of arithmetical study frequently involves no computation whatever, but that such quantitative thinking has a much greater frequency and possibly greater importance than does pencil-and-paper computation on which most of the recommendations for eliminating subject matter had been based. A second proposal by the critics was that studies of social utility should have a positive effect upon programs of study and that, instead of merely searching for topics to eliminate, they should serve as a guide for extending the program of study where needed. The notion of 'social utility' has benefited greatly by these criticisms and more recent research has been directed,

through analyses of noncomputational activities, toward the finding of some generalizations useful to the curriculum-makers. The research that has been stimulated by this broader application of the principle of social utility is doing much to counteract the effects of the superficiality of the earlier studies, which considered arithmetic chiefly as computation. The more recent effect of research consequently has been to enrich the program of arithmetic by emphasizing training in the opportunities for quantitative thinking in addition to training in computation.

III. CONTRIBUTION OF THE MEASUREMENT MOVEMENT

In the preceding paragraph it has been seen that research has affected the program in arithmetic, first, by reducing the computational topics, and later, by enriching the noncomputational, thinking aspects of the subject. Interacting with these influences there was another major type of research that had a profound bearing upon the subject of arithmetic; namely, the measurement movement, which, indeed, first became widely known through its application to this subject.

Prior to 1910 Courtis had begun his experiment with standardized tests in arithmetic. The survey movement that was soon to get under way afforded a striking opportunity for the widespread application of such tests, as for example, in the use of the Cleveland Survey Tests in the surveys of Cleveland, Grand Rapids, and St. Louis. It is significant to note that the Courtis Tests and the Cleveland Tests were based upon computational ability in nonverbal situations. Researches through the use of these and similar testing instruments soon became numerous and had a pronounced effect upon the improvement of computational ability, an outcome too well known to require detailed comment here. Indirectly they served as measures of the efficiency of instruction.

A significant fact, not so well known, is the relation between the testing movement and the development of practice exercises in arithmetic. It is logical that if arithmetical abilities are to be measured by standardized tests made up of nonverbal computational examples, an improvement of this ability would result from practice with the same kind of materials used in the test. Very early in the testing movement, Courtis, Studebaker, and Thompson had each prepared elaborate sets of such practice exercises and when these were placed on the market their acceptance was phenomenal. Soon other authors added to the

practice materials available, until by the year 1925 the annual sale of these exercises reached into the millions of copies.

The very preparation of many of these practice exercises was the result of other types of research that dealt with the relative difficulty of number combinations, the frequency of occurrence of different arithmetical operations, and the general conditions desirable for practice.

The net outcome of this extensive activity with arithmetical tests and practice exercises was the preparation of materials that fitted exactly into the reduced arithmetic program of the advocates of the theory of social utility; but the subsequent influence upon the teaching of arithmetic produced a situation that has caused grave concern. This situation may be summarized by these statements: first, the outcome of the researches by the social utility group was such stringent elimination of material from the subject matter of arithmetic that only a narrow body of computational content remained; second, in order to secure a hypothetical one hundred percent mastery of this limited content, the teaching of arithmetic became dominated by a drill theory that made use of practice exercises limited not only to computation but, for the most part, to nonverbal computation. The reflection of this situation in arithmetic is found in the report of the Committee on Arithmetic of this Society that was published in 1930.² This Yearbook marked a turning point in the treatment of arithmetic, a turning point due not only to the material presented by the major committee but also in a large measure to the excellent critique of the Yearbook presented by a reviewing committee and printed as the last chapter in the Yearbook. Both committees agreed in a strong reaction against the reductionist point of view resulting from the narrow application of the theory of social utility. The reviewing committee went further in emphasizing the informational, sociological, and psychological function of arithmetic in addition to its purely computational function. This committee also laid stress upon the place of problem work in arithmetic. Since 1930, the drill theory of arithmetic has been subject to criticism from a number of quantitative investigations and more attention has been given to studies of problem-solving and quantitative thinking of a noncomputational variety.

The influence of recent research is already apparent in published

² *Twenty-Ninth Yearbook*, 1930. Part I, "Some Aspects of Modern Thought on Arithmetic"; Part II, "Research in Arithmetic."

materials, both in pamphlet and textbook form, that aim to enrich the pupil's number experience and his fund of arithmetical information. For example, the enrichment of the topic, 'measurement,' indicates the influence of historical research by dealing with the origin and development of our common measuring units as well as using them in computation. In this way research is adding to the arithmetic program a vital kind of material that was almost entirely lacking in the arithmetic course as narrowed to the demands of practical computational ability.

IV. RESEARCH ON THE RELATION OF MATURITY TO ACHIEVEMENT

A third line of research that is having a definite influence on arithmetic concerns the relation of arithmetical achievement to maturity.

The study of the arithmetical abilities of children on entering school has greatly enriched our understanding of the possibilities of the subject at the primary level. Because of these findings there has been an expansion of arithmetic in the primary grades, in which the older abstract drills on number combinations are deferred until concrete experiences lead to basic understandings of number. Then number combinations are presented as a foundation for the more systematic arithmetical content of the third grade.

At higher levels numerous investigations have had to do with grade placement, in which the problem was to discover the optimal point for introducing a given topic in arithmetic. The conclusions reached through these investigations are plainly evidenced in present courses of study. Numerous topics have been deferred until a later year to allow a greater degree of maturity on the part of the child before the topic is attacked. The combined results of these movements have been to relieve the pressure in arithmetic in the middle grades where the percentage of failure has always been abnormally high. The present broadening of approach in the primary grades is the logical outcome of the inventories of number abilities of young children, whereas the deferring of other topics from the middle to the upper grades is the natural result of two types of investigation: first, those studies of grade placement which showed that topics that are not mastered readily at the age or grade levels where they have been presented may be mastered more readily and by more pupils at a later time; and second, the introduction of more informational and noncomputational arithmetic in the upper grades where it may be integrated with the content of other parts of the curriculum.

V. RESEARCH ON METHODS OF TEACHING

A fourth contribution of research to arithmetic and the last to be mentioned here relates to improved methods of teaching. These improvements have come mainly from the psychological analyses of the learning of arithmetic. Diagnostic testing has found many examples of misunderstanding on the part of pupils caused by a formal kind of teaching and a lack of understanding that so frequently accompanies the drill method of instruction. Evidence from many sources shows that diagnoses of the mental processes of children have led to better directed attempts to give meaning to the teaching of arithmetic and to build up a concrete basis for the abstract relationships that are to be mastered as the end-product of the subject.

While a consideration of individual researches in arithmetic leaves one with the feeling of frequent contradiction and confusion, a survey of the entire subject shows clearly that the combined results of research are exerting a rational directing influence upon the arithmetic program as a whole.

II

CONTRIBUTIONS TO SECONDARY-SCHOOL MATHEMATICS

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The literature relating to the teaching and organization of mathematics discloses many important changes that have taken place during the last three decades. Many of the changes have been the result of studies that began with problems of general education and were then carried further in the special subjects.

In general, so far as they pertain to secondary education, the changes are conveniently classified under the following six topics: (1) the development and uses of tests for purposes of improvement of instruction, (2) the determination of objectives, (3) individual differences of pupils, (4) the selection, and (5) the organization of instructional materials, (6) the comparison of methods of teaching, and (7) the determination of the mental processes employed by students of mathematics.

I. THE DEVELOPMENT AND USES OF TESTS

The development of tests in the field of education has made a profound impression on the teaching of mathematics. Tests have become the most useful instruments for measuring and improving the results of instruction. It was natural that the tests should be used very early in arithmetic: *e.g.*, the reports of Courtis in 1909. Algebra, being in many respects similar to arithmetic, was the next subject in which research with tests was carried on. From there the movement progressed to other fields of mathematics.

The new objective tests had many advantages over the older performance tests and were readily adapted to mathematical materials. As improvements continued, the opportunities for the use of tests increased. The Cleveland Survey arithmetic tests, the *Monroe Standard Reasoning Test*, the *Buckingham Scale for Problems in Arithmetic*, the *Pressey Technical Vocabulary Test of Arithmetic*, and the *Buswell-John Diagnostic Tests for Fundamental Processes in Arithmetic* are illustrations of the wide uses that were being made and of the variety of tests that were being developed.

The number of mathematics tests for the secondary-school subjects is not so large as for arithmetic, but there is the same variety to supply different needs. The first tests by Rugg were of the performance-and-practice type. The *Hotz Algebra Scales* were designed to measure algebraic ability. The *Rogers Test of Mathematical Ability* and the *Orleans Algebra and Geometry Prognostic Test* were designed to aid teachers in advising pupils, to estimate in advance the pupil's success in mathematics both in general and in the special branches, and to classify pupils into homogeneous groups. Then followed survey tests, achievement tests, inventory tests, and diagnostic tests, each type designed for the purposes indicated by the titles. Today the use of tests in mathematics has become a regular part of instruction, and most of the modern textbooks include tests as aids to pupils and teachers.

II. THE DETERMINATION OF OBJECTIVES

It is not very long ago that the content of mathematics courses for the secondary schools was determined entirely by mathematical experts, many of whom had no contact with the pupils for whom the courses were intended. The major objective of these courses was preparation for more advanced work in mathematics. Frequently this was the only objective. The student's fitness was measured by performance

tests. There was no way of determining whether certain other rather intangible values, such as appreciations, attitudes, and power to study, claimed for the subject were being attained, because tests for such attainments had not been constructed.

The movement in education to formulate lists of general educational objectives that the pupils should be expected to attain is typified by the work of Bobbitt and later by that of the Committee on the Reorganization of Secondary Education. It has influenced the teachers of mathematics to examine their offerings carefully. Corresponding to the general educational objectives set up by leaders in the field of education, lists of general mathematical objectives have been set up, such as appreciation of mathematics needed in everyday life, power to analyze quantitative situations, functional thinking, reasoning power, appreciation of the mathematics in the history of civilization, and others. To these general mathematical objectives have been added subject objectives, course objectives, and unit objectives. Sometimes research on the problem was carried on by individuals, as in Schorling's study of the objectives of junior-high-school mathematics, and sometimes the work was done by committees or groups of teachers seeking a better basis for the course of study.

The course of study has been greatly influenced by the attention given to the importance of objectives. As long as the major objective was facility in mechanical manipulation, emphasis was on drill and automatic response. When other objectives, such as understanding of concepts and relations, ability to think quantitatively and to draw correct inferences, and appreciation of non-computational mathematics, were considered equally important, the content and methods of courses changed accordingly. The change has been from overemphasis on computation to greater emphasis in the informational and social values of the subject, on the practical and social applications, and on stimulating interest and creative activities. Much aimless teaching has been eliminated.

III. INDIVIDUAL DIFFERENCES

The development of educational tests and measurement soon led to the discovery that children differ from one another in every measurable trait. Group instruction had made no adequate allowance for these differences, which were too large to be overlooked in teaching. In a group of children as they normally come in classes some pupils will do from three to five times as much in arithmetic as others. When the studies

made in arithmetic were repeated in algebra and geometry, the same differences were found. The problem of providing for these differences has stimulated much research and has motivated various plans of individual instruction, like the Batavia Plan, the Pueblo Plan, the Dalton Plan, and the Winnetka Plan. These plans seemed, on being checked by tests, to have overcome some of the defects of group instruction.

In addition to the foregoing plans of individual instruction a number of other procedures have been employed to reach the individual. Pupils are grouped according to ability as disclosed by intelligence tests, prognostic tests, and other factors of importance to success. Courses are differentiated for college preparatory and non-college pupils. Differentiated assignments within courses are provided for the slow and the bright pupils in classes. Smaller classes for the slow, diagnosis of difficulties, and remedial instruction aimed to accomplish for the slow what special projects, optional topics, honor work, and maximum courses try to do for the gifted pupils.

Perhaps one of the best methods to supplement group instruction is the supervised study technique, which has been widely introduced in the teaching of mathematics. In 1932 the National Council of Teachers of Mathematics supported the supervised study movement by appointing a Committee on Individual Differences to investigate the merits of ability grouping and of differentiated curricula in mathematics. A subcommittee on the administrative phases of the problem of individual differences was appointed later. The reports of both committees were published in the *Mathematics Teacher* (November, 1932, October, 1933, May, 1935, and April, 1936).

IV. THE SELECTION OF MATERIALS OF INSTRUCTION

When the earliest studies relating to the content of the educational subjects disclosed wide differences in practice among schools in regard to the topics presented and the time allotments, investigators began to formulate principles for retaining or eliminating subject matter and for determining new materials to be introduced, as has already been described in the earlier pages of this chapter. Wilson, who made one of the earliest studies,³ based his conclusions on the principle of busi-

³G. M. Wilson, "A Survey of the Social and Business Use of Arithmetic." *Sixteenth Yearbook*, Part I, of this Society, 1917. Chapter VIII. See also his *A Survey of the Social and Business Usage of Arithmetic*. (Teachers College, Columbia University: New York, 1919)

ness usage. Another principle was that of social usage. Thus, Adams⁴ aimed to determine the arithmetic used by adults from the analysis of newspapers. Charters⁵ studied department-store arithmetic; Woody⁶ the arithmetic in certain types of salesmanship; and Mitchell⁷ the arithmetic of factory pay-rolls and hardware-store catalogs.

A somewhat different attack on the problem was made by a method of analysis of children's activities and of the arithmetical needs of children in subjects other than mathematics, such as sewing or shop-work. These studies of arithmetical needs were soon followed by similar studies of the secondary-school subjects that yielded valuable information about the needs in arithmetic, geometry, and algebra experienced by pupils when studying general science, physics, chemistry, the arts, and the social sciences. The National Committee in its report of 1923 recommended eleven topics for omission from courses in mathematics and ten others for inclusion.

As valuable as the studies made so far may be, there is need for further research. Serious objections have been raised against conclusions drawn when only one of the above methods is used. "The curriculum-maker," says Judd, "who thinks that he has exhausted the catalog of the uses of numbers when he has listed the examples which ordinary men solve in a day or week is superficial to such an extreme degree that he is an unsafe guide in arranging the plans of the school."

V. THE ORGANIZATION OF MATERIALS OF INSTRUCTION

The aims and purposes of a subject determine to a large extent its organization for instruction. In a course in which emphasis is on drill the organization will differ from that of a course in which emphasis is on social values. Courses have been organized on a logical basis, in which topics are studied one at a time to the exclusion of all others, or on a psychological basis in which the simple aspects are presented

⁴H. W. Adams. *Mathematics Encountered in Grade Readings of Newspapers and Periodicals*. (Master's thesis, Department of Education: University of Chicago, 1924)

⁵W. W. Charters. *Curriculum Construction*. (Macmillan Company: New York, 1923)

⁶C. Woody. "Types of arithmetic needed in certain types of salesmanship." *Elementary School Journal*, 22: March, 1930, 665-667.

⁷H. S. Mitchell. "Some Social Demands of the Course of Study in Arithmetic." *Seventh Yearbook, Dept. of Superintendence*. (National Education Assoc.: Washington, D. C., 1929)

first and the order of topics determined by principles other than logical. Arithmetic has also been organized on a social basis.*

Another form of organization that has received a great deal of attention in recent years is the 'unit plan' advocated by Morrison. Courses in 'correlated' and 'general' mathematics have been received favorably by teachers of secondary-school mathematics. Recently new impetus has been given to this type of mathematics by the movement toward integration, which favors the uniting of subject matter that pedagogically belongs together. Research is being conducted on a large scale. In mathematics it is aimed not only to correlate with each other the various mathematical subjects but also to bring about a closer correlation of mathematics and other school subjects. The movement is reflected in the titles of the newer books. Few books for Grades VII and VIII are now called "Arithmetic." They are replaced by such titles as "Seventh-Year Mathematics," "Practical Mathematics," "Progressive Mathematics," "Mathematics of Today," and "Mathematics for Everyday Life." Lide reports in his monograph, *Instruction in Mathematics*, that in 60 percent of the schools observed by him the mathematics of Grades VII and VIII is designated as "general mathematics" or simply as "mathematics."

Numerous articles have appeared in the last two or three years reporting research on the relation of mathematics to other fields, such as art, science, social science, industry, nature, engineering, and statistics.

VI. THE COMPARISON OF METHODS OF TEACHING

The educational literature reports an abundance of research to determine the effectiveness of methods of teaching. Methods of research have been developed that made it possible to compare new methods with the older traditional methods. A common procedure has been to submit both to test conditions with two comparable groups of pupils. When such experimentation was not possible, investigators have used the method of frequency of usage to draw their conclusions. Some of the questions related to the teaching of arithmetic that have been investigated are systematic and formal training as compared with incidental training, the addition method of subtraction as compared with the 'take away' method, the use of games and plays as devices for motivating and arousing interest, individual instruction compared with group instruction, the unit plan and the recitation plan, and the method

* See, for example, Frank M. McMurry and C. Beverley Benson. *Social Arithmetic, I, II, III*. (The Macmillan Company: New York, 1926)

of remedial instruction. In most of these investigations the differences between the compared methods or conditions have been surprisingly low; nevertheless, they supplement opinion with objective evidence and aid the teachers to make decisions with greater confidence. There is much to be said for the development of better methods for deciding debatable questions of methods of teaching.

VII. THE DETERMINATION OF THE MENTAL PROCESSES EMPLOYED BY STUDENTS OF MATHEMATICS

The development of diagnostic tests has facilitated the problem of studying the mental processes by which pupils arrive at results. Numerous studies have been made in the field of arithmetic. This was soon followed by similar studies in algebra and geometry. Three procedures have been frequently used: (1) A process is broken up into its component parts. Tests are then made by which frequencies of errors on these parts are obtained, and further studies are made of those of greatest frequencies. (2) Pupils are called in for conference to explain how they arrived at erroneous results. (3) Pupils are given an individual test in which they state aloud the thoughts that lead them to carry a process to conclusion. The last method is tedious, but it discloses both correct and incorrect mental processes. It is as important to know the mental processes of the brighter pupils as the faulty processes of the poor thinkers. It may thus be possible to communicate to the learner such mental processes as enable him to rise above a method by which he tries to acquire facts merely by rote memorization.

One of the most elaborate studies of this type is Judd's study of counting, which is reported with several other studies in his recent book, *Education as Cultivation of the Higher Mental Processes*. Knight's study of long division⁹ and Brueckner's reports on diagnostic and remedial teaching¹⁰ are other good examples. In algebra Everett's study of the fundamental skills,¹¹ and in geometry Welte's psychological analysis¹² are typical of the kind of research that has been done and is being carried on at the present time.

⁹ F. B. Knight. "Comments on Long Division." *Fourth Yearbook, Department of Superintendence* (National Education Assoc.: Washington, D. C., 1926)

¹⁰ L. J. Brueckner. *Diagnostic and Remedial Teaching of Arithmetic*. (Houghton Mifflin Co., Boston, 1931)

¹¹ J. P. Everett. *The Fundamental Skills of Algebra*. (Teachers College, Columbia University: New York, 1928)

¹² Herbert Welte. *A Psychological Analysis of Plane Geometry*. (University of Iowa: Iowa City, Iowa, 1926)

CHAPTER XI

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: NATURAL SCIENCE

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Investigations in science teaching have been carried forward on a fairly broad front through the interval of the past fifteen years. They have been concerned (1) with the evaluation of subject matter and methods used in current practices in teaching, (2) with the continuous revision of subject matter and methods, and (3) with the study of the learning process. The contributions to science teaching from these investigations will be considered under these three headings.

I. EVALUATION OF SUBJECT MATTER AND METHODS

An effective stimulus to carry on studies in evaluation came from reports of observations, more or less carefully controlled, of the ability of students to respond accurately when examined on the materials they have been taught. A number of years ago an examination¹ of ten questions in physics similar to those included in textbooks (five were numerical problems) was administered in ten Indiana colleges to entering freshmen who had studied physics in the high school. The scores in the different colleges ranged from 8.7 percent to 24.9 percent, average 19.7 percent (of a perfect score). The most difficult question was: "What is meant by the statement that a lens has a focal length of eight inches?" In two colleges the score on this question was zero and the average score in ten colleges was 0.9. The easiest question was: "Taking the coefficient of steel at .000011, find the total length of an iron bridge at 20° C if its length at 0° C is 100 feet." The average score on

¹S. L. Foley. "The college student's knowledge of high-school physics." *School Science and Mathematics*, 22: October, 1922, 601-611.

this question was 3.5. A similar examination² (except that all the problems were selected from mechanics) was given in physics classes in the high school and with similar results. The results from both these investigations were characterized as "surprising," or "startling," or "appalling."

There were similar investigations of chemistry teaching. One carried on by the writer³ used tests of ability to recognize and to write formulas and equations, to solve problems, and to respond to other factual items. In all, responses obtained in from 12 to 20 schools to 350 test items were analyzed. Again, the results were "startling" or "appalling." Here was convincing evidence that most pupils did not gain ability to solve problems in chemistry, or to write equations and formulas, or to describe processes in industrial chemistry. Particularly startling was the low percentage of correct responses to so many items of the examinations, particularly by non-college preparatory students. The attention of teachers was directed forcibly to what pupils could do on examinations made up of the factual material they had been taught.

These findings have affected practice in two ways. They have served as a challenge to improve methods of instruction and by this means have raised the level of achievement on factual examinations. They have raised questions concerning the choice of subject matter used in instruction, which seemed obviously to be poorly adapted to the needs and interests of many students.

The construction of standard tests and scales followed naturally from these earlier efforts to evaluate results in teaching by checking with examinations. The test items were selected and arranged by standardized techniques. Some of these tests, provided with established norms, have been published commercially and have had wide distribution. The norms have been used by teachers as standards for evaluating their own teaching, and they have been used to some extent by administrative and supervisory officers to evaluate the work of the

² Randall, Chapman, and Sutton. "The place of numerical problems in high-school physics." *The School Review*, 24: 1918, 39-43. (Also in Curtis. *Digests of Investigations in the Teaching of Science*, I, p. 40. P. Blakiston's Son and Co.: Philadelphia)

³ S. R. Powers. *A Diagnostic Study of the Subject Matter of High School Chemistry*. (Contributions to Education, No. 149. Teachers College, Columbia University, 1924; also in Curtis. *Digests of Investigations in the Teaching of Science*, I, p. 313)

teaching staff. This use of tests and scales has unquestionably effectively stimulated thoroughness in learning facts.

The findings from these examinations and tests seem to have given impetus to interest in methods of teaching. A review of the literature on methods in science teaching appearing in the interval of the past fifteen years shows many innovations. These include the project, contract, drill, extensive-reading, unit-plan, assignment-recitation, guidance-outline, developmental-discussion, study-guide, topical, problem, remedial, and other methods.⁴ In addition, there were innovations in methods of laboratory teaching and in methods featuring visual aids, including both still pictures, silent films, and sound films.

The tests and scales that stimulated innovations in method naturally found application also in investigations designed to check the effectiveness of these innovations. They were used to give each student a definite numerical achievement score, and the scores were useable for statistical treatment. They were therefore readily available as instruments for comparing achievement of students taught by different methods.

It is difficult to draw a precise conclusion concerning the effects on practice from the investigations of the effectiveness of the various methods listed in the preceding paragraph. Many are of little or no significance because of inadequate technique. Others are open to criticism with respect to the validity of the examinations. Not uncommonly the investigator is enthusiastic for one method and his reports seem to favor this bias unduly. That is to say, that method turns out to be best that most effectively stimulates the enthusiasm of the teacher. Conversely a method disliked by a teacher is not likely to yield good results in his hands. It may be observed in this connection that the methods used in control classes have often been those not favored by the investigator. Some studies, however, have been of far-reaching significance, and have unquestionably served to sharpen and to perpetuate a healthy concern for methods of teaching.⁵

⁴The adjectives listed here are taken directly from reports of investigations of teaching methods.

⁵Curtis has reviewed these studies in his *Digests of Investigations in the Teaching of Science*, I and II, and in the *Thirty-First Yearbook, Part I*, of this Society, Chapter VI. Another review of them is given by Engelhardt in *Review of Educational Research*, 2: 21-28.

II. METHODS OF LABORATORY TEACHING

Methods of laboratory teaching have long been a center of interest and many investigations have been reported, especially comparisons of results achieved on tests, by students taught by the "individual laboratory" method, the method of "laboratory demonstrations," or some combined or modified form of these two.⁶ The rapidly increasing number of students entering public high schools served as an effective incentive for those investigations. The traditionally accepted method of laboratory teaching was one in which each student worked more or less independently using his own stock of apparatus. In the interval between 1910 and 1930 the number of students enrolled in public high schools increased from less than one million to nearly four and one-half million. This made it seem impracticable to extend the privilege of individual work to all; the situation therefore favored extension of the demonstration method.

In a typical investigation the control class is taught by the method of individual laboratory work and the experimental class by the method of demonstration. The measures used in these comparative studies were objective tests, usually prepared by the investigator, but sometimes supplemented by commercial tests. The usual outcome was that the two groups did about equally well, thus supporting the conclusion that laboratory demonstration was as good as the traditionally supported method of individual work, or better than it, since the demonstration was more economical of time and material.

A critical examination of these studies, however, seems to furnish ground for questioning the soundness of some of the conclusions. To support the conclusion that one method is better it would seem necessary to assume (1) that the same, or similar, outcomes were implicit in each method, and (2) that the examinations were valid measures of these outcomes. Obviously these assumptions cannot be accepted without reservations, because presumptively the same outcomes are not implicit in each method. The learning experiences they provide differ and hence the outcomes must differ in some particulars. An examination that fails to reveal differences where differences exist must be judged invalid.

⁶ These studies have been reviewed in a number of places. See Curtis' review in Chapter VII of the *Thirty-First Yearbook, Part I*, of this Society, and the various issues of *Review of Educational Research* devoted to Special Methods and Psychology of Secondary-School Subjects.

Another objection to these investigations of laboratory teaching is that one seems to find in them evidence of biases favoring one or the other of the methods. As already stated, practical considerations favored the demonstration method. Looking back over these many studies, it appears that in some instances a semblance of scientific experimentation has been used to give respectability to changes in method primarily made to accomplish economy and in other instances to strengthen a bias that teachers were loathe to relinquish.

The technique of examination has been used in other comparative studies of method, *e.g.*, studies in which the size of the class, the time allotted for laboratory work, for reading, for class discussion differs in the experimental from that in the control group. In general, these studies fail to show significant differences in the variables under comparison.⁷

The experimental method has been used to investigate the effectiveness of motion pictures as an aid to teaching.⁸ In one well-known investigation, textual matter was prepared especially for use in the experiment. Films were used in the experimental class, but not in the control. A second study followed a similar procedure. In both instances the results favored the use of the films.

III. REVISION OF SUBJECT MATTER AND METHODS

As already suggested, the low scores of students on examinations impel one to question the appropriateness of subject matter taught them; it may have been too difficult or its meanings may have been too remote from student interests. The questioning served as an incentive for analyses of textbooks, courses of study, and examinations.

Vocabulary studies showed that textbooks carried an appalling number of scientific terms.⁹ Of the texts for the senior high school those in biology were found to carry the heaviest vocabulary burdens. Analyses showing the number and kind of quantitative concepts in the descriptive matter of texts and required in the solution of problems at ends of chapters, particularly in texts in physics and chemistry, threw further light on the nature of the difficulties encountered by stu-

⁷See Reports of Investigation in College and University Classes by V. H. Noll, A. W. Hurd, and P. O. Johnson. These are reviewed in Curtis' *Digests*, II.

⁸See reports by Wood and Freeman, by Arnsperger, and by Rulon.

⁹See reports of vocabulary studies by Curtis, Powers, and Pressey. These are reviewed in Curtis' *Digests*, II and in the *Thirty-First Yearbook, Part I*, of this Society, Chapter VI.

dents. These analyses supported the conclusion that textbooks were too difficult or too abstruse for many, if not most, of the students required to use them. This demonstration had a very positive effect on practices in textbook-writing; authors tried to restrict the use of technical terms to those essential or important and made larger provision for gaining command of these terms through repetition of use in the text and through provision for their use in drill exercises. Authors and publishers became vocabulary conscious in the field of science.

During the same period there has been in evidence a tendency to reduce the number of quantitative concepts used in texts. It appears now that a word of caution may be necessary lest we go too far in the simplification of reading matter. The earlier studies indicated pretty clearly that the reading matter of texts was too difficult. We need now to get better information as to how difficult the reading matter of texts may and should be, and particularly to get better information as to the ability of children to use quantitative concepts in their thinking.

These reports on the difficulty of subject matter did more than develop a consciousness of vocabulary. They also developed a consciousness that much of the subject matter was concerned with topics and events remote from the life of the students for whom it was written. This observation stimulated investigations planned to reveal pertinent problems and issues of life and at the same time a subject matter that is related to them.

There have been several studies of children's interests. Many of these have been based upon children's questions or upon their direct statements of interests. A recent study¹⁰ shows that children's statements of interests are in large measure invalid, that when asked to express their interests they will, within a single exercise, make many conflicting and even contradictory statements. Of course, it must not be concluded from these observations that children do not have interests, only that the simple procedure of asking them what their interests are is not likely to result in many dependable data. These earlier studies have served a useful purpose in that they have undoubtedly contributed indirectly to enrichment of the curriculum. In addition, they have encouraged teachers to center their attention more directly upon the interests of children, and they have served to show something of the complexities involved in the study of interests.

¹⁰ F. L. Fitzpatrick. *Science Interests*. (Bureau of Publications, Teachers College, Columbia University, 1936)

Some investigators, in efforts to develop subject matter that is more closely related to human interests and needs, have analyzed for scientific concepts, newspaper and magazine articles, books for popular reading, and reading matter from other sources. Others have centered attention more directly on the individual in action.¹¹ One of the recent studies reports a list of earth-science generalizations suitable for developing ability to interpret the physical features of the earth's surface.¹² Another reports a list of generalizations in chemistry selected for the contribution to interpretations of observations and of unspecialized reading matter.¹³ A third includes a list of principles and generalizations suitable as goals of instruction in the elementary grades and a list of topics that contribute to the understanding of these principles.¹⁴ A fourth study reports materials selected for curricular use in a particular region.¹⁵ There is an obvious need for further work of this general character, and work now in progress promises to contribute significantly to procedures for relating the life of the school to the life of the child and society.

IV. THE LEARNING PROCESS

Investigations that appear to be of greatest significance in their implications are those concerned with identification and description of specific learning outcomes and the conditions in which these have been attained. In one of the early studies¹⁶ attention was centered on

¹¹ Illustrative studies reviewed in Curtis' Digests are those by Curtis, Harap, Craig, Downing, and Searle and Ruch.

¹² Herbert J. Arnold. *The Selection, Organization, and Evaluation of Localities Available for Unspecialized Field Work in Earth Science in the New York City Region*. (Distributed by Bureau of Publications, Teachers College, Columbia University, 1936)

¹³ Clarence M. Pruitt. *An Analysis, Evaluation, and Synthesis of Subject Matter Concepts and Generalizations in Chemistry*. (Doctor's dissertation, Teachers College, Columbia University, 1935)

¹⁴ Martin L. Robertson. *A Basis for the Selection of Course Content in Elementary Science*. (Doctor's dissertation, University of Michigan, 1933)

¹⁵ Feaster Wolford. *Methods of Determining Types of Content for a Course of Study for Eighth-Grade Science in the High Schools of the Southern Appalachian Region*. (Doctor's dissertation, Cornell University, 1935)

¹⁶ Oswald F. Black. *The Development of Certain Concepts of Physics in High-School Students*. (Reviewed in the *Thirty-First Yearbook, Part I*, of this Society, pp. 69-72, and in Curtis' Digests, II, p. 239.)

the nature of the concepts of gravity, mass, weight, heat, light, and dew formation acquired by students who do not study general science or physics and also the nature of the concepts acquired through study in these subjects. An investigation¹⁷ in the teaching of chemistry includes an analysis of the procedures through which students gain skill in laboratory techniques, how they gain ability to generalize in particular situations, and how they grow in ability to solve problems. These take departure from educational objectives, the validity of which rests upon conceptions of educational value. They are not concerned with one method or technique as against another, but with the whole of the experiences contributing to the objective. The learning experiences are presented with emphasis on broad relationships. The experiences of the classroom when presented in these relationships are more nearly similar to the experiences of normal living than those that are limited to the framework of a particular technique or subject matter. The piecemeal method of research has not been so useful in educational planning as has that which views the learning process in broad relations.

A carefully controlled investigation¹⁸ of methods of work and study used by children in eighth-grade classes shows procedures that may be used profitably by teachers in directing study. The investigator demonstrated the effectiveness of each of the following techniques of directed study: (1) study a paragraph to discover its central idea and its outstanding contributing ideas; (2) formulate the questions one must be able to answer in order to understand a topic; (3) read a unit entirely through to ascertain the general plan of the unit and then group the major facts presented around this plan; and (4) give the pupils a method for solving thought questions and practice in using it. The findings showed that the use of these four techniques of study increased the ability of the student to interpret what he reads but there was some evidence that their use made the rate of reading somewhat slower.

A significant study of the relation between rate of learning and scores on intelligence tests throws into question the practices of classi-

¹⁷ Ralph E. Horton. *Measurable Outcomes of Individual Laboratory Work in High School Chemistry*. (Teachers College Contributions to Education No. 303, 1928. Reviewed in *Thirty-First Yearbook, Part I*, of this Society, pp. 72-75, and pp. 102-104. Also in Curtis' *Digests*, II, p. 299.

¹⁸ Wilbur L. Beauchamp. *Studies in Secondary Education, I*. (Supplementary Educational Monographs, No. 24. The University of Chicago, January, 1923, pp. 47-87. Also in Curtis' *Digests*, I, pp. 75-85)

fying pupils into slow, medium, and fast groups. The investigator¹⁹ reports that, while a few slow pupils are definitely identified as such, most of the pupils change their relative positions, so that there is no significant correlation between measures of mental ability and rate of progress.

An admirable illustration of research concerned with identification and description of specific learning outcomes is reported from working with college classes in zoology.²⁰ The investigator used instruments designed to measure: (1) ability to recall important facts, (2) ability to formulate reasonable generalizations from specific data of an experiment; (3) ability to plan an experiment to test a given hypothesis; and (4) ability to apply general principles to new situations. Using these instruments, he showed advantage to students from the use of an interview technique and advantages from the use of a method of remedial instruction. In a study of permanence of learning he demonstrated that specific information was most quickly forgotten, that information of more general application was more permanent, and that during a fifteen months' period there was no loss in the ability of students to apply important zoölogical principles to new situations or to interpret data obtained from experiments. The demonstration of this last point is an achievement that bids fair to exert a far-reaching influence on science teaching and on teaching in other fields.

Not much progress has been made in reporting the conditions under which learners attain scientific attitudes and achieve ability to use the methods of working peculiar to the sciences. An outline of the scientific attitudes prepared in 1924 is still one of the most useful available.²¹ There have been some stimulating studies of methods used to identify scientific habits of thinking.²² It appears, however, that the scientific

¹⁹ Wilbur L. Beauchamp. *Studies in Secondary Education, II*. (Supplementary Educational Monographs, No. 26. The University of Chicago, February, 1925, pp. 14-32. Also in Curtis' *Digests, II*, pp. 108-114)

²⁰ Ralph W. Tyler. "Some findings from studies in the field of college biology." *Science Education*, 18: October, 1934, 133-142. (Also in *Constructing Achievement Tests*, 1934, pp. 76-91)

²¹ Francis D. Curtis. *Some Values Derived from Extensive Reading of General Science*. (Doctor's dissertation, Teachers College, Columbia University)

²² I. C. Davis. "Measurement of scientific attitudes." *Science Education*, 19: October, 1935, 117-122.

V. H. Noll. "Measuring the scientific attitude." *Journal of Abnormal and Social Psychology*, 30: July-September, 1935, 145-154.

methods are commonly presented and 'studied' in science classes through experiences of the specialists in highly refined research. These methods may be useful to the individual preparing for specialization, but they are probably not very effective for preparing an individual to use the experimental method in his personal and social life. The need seems indicated for studies of processes in learning in which the methods of science are used in the consideration of problems of normal experience. There is much activity in this area of study, so that significant results may be expected in the near future.

V. RECENT TRENDS

A characteristic feature in the trends that have been in evidence in research in science teaching is the shift from studies of how we learn facts more or less in isolation to studies in which, in so far as practicable, the whole of the learning process is considered. In the earlier studies attention was centered, in physics on learning principles, definitions, and formulas, and in chemistry on the occurrence, preparation, and properties of common elements and their compounds, on formulas and equations, and on laws and principles. Experiences were isolated from the environment and from daily life and presented in some logical organization in textbooks and in classrooms and laboratories. Learning was generally interpreted as the process by means of which the student gains such command of these isolated experiences as is necessary to 'pass' the factual examinations. The results from the examinations, reviewed critically from the perspective of educational philosophy, have served as effective stimuli to seek richer values.

A pioneer effort to show the relation between objectives of science teaching and the broad aims of education is contained in the *Thirty-First Yearbook, Part I*, of this Society. The emphasis in that yearbook is upon education through experiences selected with recognition of problems that grow out of needs and interests and presented in the same broad relations in which they occur in life. Such experiences will provide a proper setting (1) for the achievement of understanding of concepts that are related to real issues of life, (2) for exercise in careful and critical methods of thinking, (3) for the development of specific attitudes, interests, and appreciations, (4) for effecting changes in ways of looking at life, and (5) in general, for affecting ways of behaving in the activities, necessary and inevitable as well as desirable, in life.

Obviously, it will require some considerable departure from the traditional organization of the special subjects if we are effectively to direct our efforts in science teaching to the achievement of this broad aim of education. Intensive work concerned with the selection of material and with its adaptation to educational objectives suggested by the foregoing is now in progress in the Bureau of Educational Research in Science in Teachers College. The activities of the Bureau include curricular work, experimental teaching, and the development and use of new instruments of evaluation.²³

Another agency actively concerned with science teaching and the broad aims of education is the Science Committee of the Commission on Secondary Schools and Colleges. This Committee in its Progress Report²⁴ "has sought to describe a program of science instruction for the secondary school which would utilize the sciences to the fullest possible extent for the purpose of meeting the needs of youth in our democratic society."

For its evaluation program this Committee is drawing upon the resources of the Evaluation Staff of the Commission on the Relation of School and College. This staff assumes that the purposes of evaluation in connection with science teaching are "to help the student, his parents, and his teachers, to evaluate his needs and achievements and to guide his progress, and to help the teacher evaluate the educational program, particularly where he is trying to develop more effective materials and instructional procedures."²⁵ This broad statement of purpose is, indeed, in contrast to earlier efforts in evaluation that were limited in large measure to the use of instruments for measuring the student's ability to recall facts.

These trends are reflected also in work in progress in general education in secondary schools and colleges throughout the country, and they are in evidence in recent reports of standardizing agencies, particularly of the College Entrance Examination Board.²⁶

²³ Anita D. Laton. "Studies of learning in school situations." *Journal of Educational Method*, May, 1937.

Samuel Ralph Powers. "Influences of science on human activities with implications for education." *Journal of Educational Method*, May, 1937.

²⁴ Commission on the Secondary School Curriculum of the Progressive Education Association. *Science in General Education: A Progress Report*, 1937.

²⁵ "Evaluation of Student Achievement and Curricular Activities in the Natural Sciences." *Science in General Education*, Chapter X.

²⁶ College Entrance Examination Board. "Proposed revision of entrance examinations in science." *American Physics Teacher*, 3: September, 1935, 126-128.

It is difficult to estimate the extent to which research in science education has influenced the trends now in evidence in science teaching. It seems most reasonable to state that conceptions of educational values arrived at through philosophy have given direction to these trends and that experimental studies have been useful in testing the philosophical conceptions.

CHAPTER XII

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: THE SOCIAL STUDIES

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The purpose of this chapter is to describe briefly a number of aspects of instruction in the social studies in which research has been actively carried on during the past generation and to suggest some of the ways in which that research has affected educational practice. No summary of all the research studies completed in this field of instruction is intended; neither is it proposed to make a critical evaluation of the research techniques that have been developed. The region to be explored is that involving the relation between research and actual school practice in instruction in the social studies. And even in this area, it is not wisdom to be too dogmatic about the causal nature of the relations. Some work that has been done under the name of 'research' is little more than the collection of evidence for pre-accepted hypotheses; in a sense such research is an effect, rather than a cause, of practice. But in more rigidly defined investigations there has been consistent, critical, and fruitful examination of hypotheses and points of view; in these fields modifications and innovations in practice seem to have resulted from the research.

In considering, then, a few of the most significant areas of research and their resultant practices, we shall suggest relations between research and (1) social-studies objectives and curricular content, (2) methods of teaching, (3) materials and equipment for teaching, and (4) testing and evaluation in the social-studies field.

I. OBJECTIVES AND CURRICULAR CONTENT

1. Objectives

The determination of social-studies objectives in any ultimate sense is a question of educational values rather than of quantitative analysis. But, operating under the general assumptions that social-studies instruction should increase good citizenship and that good citizenship consists in effective coping with the problems and perplexities of normal living, the 'activity-analyzers' of the past generation have had noticeable effect on the formulation of specific objectives and on the selection of curricular content. Activity analysis, launched in the social-studies area about 1910, has attempted to tabulate such items as (1) the minimal civic information citizens should possess, (2) the concepts that are basic to ordinary social thinking, (3) the problems or issues that are relatively significant and enduring, and (4) the traits and qualities of good civic behavior.

Some seventy studies have been made in this field.¹ Investigators have worked out various techniques. In 1910 Whitbeck tabulated opinion among experts to determine "most important" geographic facts;² in 1913 Charters launched a whole series of studies of most commonly mentioned social-studies items in magazines and newspapers;³ in 1918 Bassett analyzed political-party platforms to discern enduring problems of American culture;⁴ in 1925 Meltzer analyzed children's social concepts;⁵ in 1929 Billings tabulated generalizations basic to the social

¹For a description of many of these studies see Earle Rugg, *Curriculum Studies in the Social Sciences and Citizenship* (Greeley: Colorado State Teachers College, 1928) and Ch. VII "The Selection of Content for Social Studies Courses" in the *Fourteenth Yearbook of the Department of Superintendence*, 1936. Additional investigations in the form of unpublished master's theses are: Edith L. Brandenburg, *Knowledge of Geography Needed by an Individual as Indicated by the New York Times Index* (Southern California, 1935), and Lawrence A. Jordan, *Concepts, Problems, and Generalizations Basic to a Conservation of Natural Resources Curriculum* (Colorado State Teachers College, 1935)

²R. H. Whitbeck. "Where shall we lay the emphasis in teaching geography?" *Education*, 31: October, 1910, 108-116.

³W. W. Charters. *Curriculum Construction*, pp. 270-272. (The Macmillan Company: New York, 1923)

⁴B. B. Bassett. *Civic Instruction of the American Electorate*. (Doctoral dissertation, University of Iowa, 1918)

⁵Hyman Meltzer. *Children's Social Concepts: A Study of Their Nature and Development*. Contributions to Education, No. 192. (Teachers College, Columbia University: New York, 1925)

studies;⁶ in 1933 Mustard tabulated civic activities of citizens in Kokomo, Indiana.⁷ Other studies have listed traits and qualities approved by various groups, problems of concern to womens' clubs and Rotarians, and especially the ideas and concepts of 'frontier thinkers.'

In many respects it seems patent that the full hopes of the activity-analysis movement were never realized. The results, often unduly local and rarely effectively coördinated, did not produce the pattern of a new curriculum. But in two respects they have had considerable effect. One has been in the particularization of objectives; that is, the reduction of abstract 'good citizenship' into component elements. Courses of study have markedly attempted to be more specific in their statements of objectives—a specificity that has often been carried to almost ridiculous extremes but that has in many cases helped to bridge the gap between ultimate objectives and day-by-day practice.

2. Curricular Content

In the second place, activity analysis has affected actual curricular content, not alone indirectly through its effect on objectives, but also directly. In the field of geography, for example, such analyses as were pertinent were summarized in the *Thirty-Second Yearbook* of this Society and influenced directly the curriculum outlined in that volume. Many textbook writers—more in the fields of civics, geography, and economics than in history, perhaps—draw upon the analyses as means of helping to determine relative emphasis to be given to topics. The Rugg materials for junior high schools draw more or less directly upon a group of these studies, as do most other recently produced texts and curricula. As Swartz has given evidence,⁸ such studies have directly influenced the work of the curriculum committees.

Yet it must be recognized that factors other than this research have affected curricula and objectives even more than has activity analysis.⁹ Studies within the social sciences themselves have revealed trends and

⁶ Neal Billings. *A Determination of Generalizations Basic to the Social Studies Curriculum*. (Baltimore: Warwick and York, 1929)

⁷ Fred P. Mustard. *Determining the Civic Information Needed by a Citizen of Kokomo, Indiana*. (Master's thesis, University of Chicago, 1933)

⁸ David J. Swartz. "The solution of a specific problem in revising a course of study in geography." *Journal of Educational Research*, 29: December, 1935, 292-297.

⁹ For elaboration of this matter, see Ch. VII, *Fourteenth Yearbook of the Department of Superintendence*.

areas of importance to the school. The effect of activity analysis has been in a sense more provocative than positive. While in some respects it has come into disrepute because of its own exaggerations, it has left its imprint upon school objectives and curricula and has fostered definite dissatisfaction with the traditional.

The determination of objectives and selection of content in actual practice are affected vitally by the teaching methods used, and especially by the examining practices recognized by schools and by examining bodies. Research on methods of teaching and on means of evaluating teaching, as described farther on, has direct and vital effect on both objectives and curriculum.

3. Organization of the Curriculum for Teaching

One aspect of the curriculum markedly influenced by research in recent years is the organization of curricular content for teaching purposes. Researches in psychology and in learning have focused attention upon the arrangement of materials in *related bodies*, if it is to be interpreted by young learners. In response to these researches, as well as to developments within the social sciences, during recent decades the social studies have been more and more organized into topics or units. Moreover, there has been a tendency to integrate content and activity—a reflection, perhaps, of investigations into the active nature of the learning process. Curricula today tend to be blocked out only incidentally into semester courses and year courses, while the primary element in their organization tends to be a learning unit—defining a unit as ‘a body of content together with implementing activities, every aspect of which is focused on an interpretative, unifying, central cluster of ideas.’¹⁰

The emphasis on arranging content with a view to grouping related elements has necessitated the overstepping of traditional subject-matter boundary lines. In many instances, the identity of the separate subjects has been preserved, but correlation among them has been stressed. In other cases, subjects have been more or less completely fused with one another. This movement is neither new nor exclusively characteristic of the social-studies field, but it has flourished to a great extent in this field especially during the past fifteen years. It owes its general stimulation and basic theory to research in educational psy-

¹⁰ Howard E. Wilson. “The unit in the social studies.” *Junior-Senior High School Clearing House*, 9: September, 1934, 29-31.

chology, but many of its specific manifestations have arisen out of curriculum research in the social studies.^{10a}

Finally, the social-studies curriculum has been affected by researches into the problems of grade placement. These researches are woefully inadequate. They have touched the central problems of acquiring meaning only indirectly, but they have been more common and more successful in the matters of vocabulary usage and training in study skills.¹¹ Many vocabulary studies have been made, including those of Pressey¹² and others in the social-studies fields, that supplement the general word lists of Thorndike,¹³ Buckingham-Dolch,¹⁴ and others. These lists have affected markedly the gradation of textbooks and the terms and concepts incorporated into course content and objectives. Indeed, their effect has been so great as to tend to mechanize some aspects of instruction; but there seems at present a tendency to reduce their importance. In the field of study skills, investigations have dealt with such matters as outlining, reading cartoons, using maps, and so forth. The outstanding research contribution here is that reported by Mathews,^{14a} whose findings formed a substantial basis for the gradation of materials used in the textbooks of Harold Rugg. Other instances of actual modification of practice to conform to research findings are

^{10a} Illustrative research studies in this area are the several that were carried on at Teachers College, Columbia University, under the direction of Harold Rugg in the 1920s and the critical analyses summarizing the movement by Howard E. Wilson in 1933 and Rolla M. Tryon in 1935. See Wilson's *Fusion of the Social Studies in the Junior High School* (Harvard University Press) and Tryon's *The Social Sciences as School Subjects*, Division Five (Charles Scribner's Sons: New York). A summary of thirteen pertinent research studies that appeared during the decade 1927-1937 is contained in Chapter V of the *Eighth Yearbook of the National Council for the Social Studies*, 1937.

¹¹ See Ch. VIII, "Grade Placement in the Social Studies," *Fourteenth Yearbook of the Department of Superintendence*, 1936, pp. 165-177; also Ernest Horn, *Methods of Instruction in the Social Studies*, pp. 16ff. (Charles Scribner's Sons: New York, 1937)

¹² Luella Cole Pressey. "The determination of the technical vocabulary of the school subjects." *School and Society*, 20: July 19, 1924, 91-96.

¹³ Edward L. Thorndike. *A Teacher's Word Book*. (Bureau of Publications, Teachers College, Columbia University: New York, 1932)

¹⁴ B. R. Buckingham and E. W. Dolch. *A Combined Word List*. (Ginn and Company: Boston, 1936)

^{14a} C. O. Mathews. *The Grade Placement of Curriculum Materials in the Social Studies*. Contributions to Education, No. 241. (Teachers College, Columbia University: New York, 1926)

to be seen in the Virginia curriculum and recent activity-program developments.

II. METHODS OF TEACHING THE SOCIAL STUDIES

A field of continuous concern for educational workers is that of method of teaching, although emphases and interests within the field are in constant flux. It is difficult to deal with the field, however, for 'method' is itself a loose term and has numerous ramifications. The number of factors related to method and the difficulty of controlling them have handicapped experimentation and have reduced the conclusiveness of much that has been done. Moreover, the personality of the investigator is itself a phase of method—a fact that has caused much 'research' on method to be little more than the collection of evidence for pre-accepted hypotheses.

1. Studies of General Types of Methods

During the past generation, especially during the 1920's, many studies of a general type were made, designed to evaluate the contract method, or project teaching, or the 'unit-mastery technique,' or 'socialized recitation' *in toto*. Many of these studies involved comparison of one method with another. Such studies contributed much to general dissatisfaction with the traditional method of textbook-recitation, but were by no means objectively conclusive in themselves. In 1931 W. G. Kimmel reviewed and evaluated twelve of these studies, reported between 1922 and 1930.¹⁵ Kimmel pointed out that "the conclusions are set forth as tentative, inconclusive, fairly conclusive so far as the particular experiment is concerned, applicable only to the pupils, methods, and teacher involved in the experiment."¹⁶ The reviewer's conclusions involve skepticism of the fruitfulness of general research into methods, a conclusion distinctly voiced by the report of the American Historical Association's Commission on the Investigation of the Social Studies.¹⁷ Wesley has recently written, "If every method partakes of varying elements and is not susceptible of delimitation, it can scarcely be quanti-

¹⁵ W. G. Kimmel. "A Review of Some Reports of Controlled Experimentation in Methods of Teaching in the Social Studies," *First Yearbook, National Council for the Social Studies*, 1931, pp. 145-176.

¹⁶ *Ibid.*, p. 170.

¹⁷ Commission on the Social Studies of the American Historical Association, *Conclusions and Recommendations*, pp. 69ff. (Charles Scribner's Sons: New York, 1934)

tatively evaluated in terms of another method which is equally indeterminate."¹⁸

2. Studies of Specific Aspects of Method

In more recent years there seems to have been a shift in research in the direction of examining specific, relatively isolable elements in teaching procedure. Wesley has said, in the same connection as above: "It might be possible to isolate one element of a method, for example, the use of maps, and reach, by controlled experimentation, a sound conclusion as to the value of the segregated element."¹⁹ To this end, for example, Eskew studies the relative value of assignment sheets and page assignments;²⁰ Jibben examines the value of pupils' notebooks;²¹ Dixon studies the effectiveness of outlining.²² Many studies, such as those by Good²³ and by Weaver,²⁴ deal with the merits of extensive, as contrasted with intensive, reading. The studies of this type^{24a} offer more opportunity for controlled and objective examination of data than do the earlier, more generalized studies, but even so, except apparently in the case of extensive reading, they are hardly definitive. A much more significant group of studies, probably destined to affect practice more directly and permanently, are those that examine directly the development of understandings on the part of pupils, and then trace the implications of their findings for teaching procedure. A number of research studies of this character are reported in Horn's *Methods of Instruction in the Social Studies*.

¹⁸ Edgar B. Wesley. *Teaching the Social Studies*. P. 475. (D. C. Heath: Boston, 1937) For a suggestive list of "Some Tentative Results of Educational Research in the Social Studies," see Appendix A.

¹⁹ Wesley, *op. cit.*, p. 475.

²⁰ Philip N. Eskew. *An Experiment to Determine the Relative Values of the Assignment Sheet and the Page or Chapter Assignment in a Seventh-Grade Social-Studies Class*. (Unpublished master's thesis, University of Indiana, 1933)

²¹ Ralph Otto Jibben. *A Study of the Value of Keeping Notebooks in High-School History and Civics*. (Unpublished master's thesis, Western State College, 1934)

²² Peryl C. Dixon. *Outlining as a Study Skill in Social Service*. (Unpublished master's thesis, Colorado State Teachers College, 1934)

²³ Carter V. Good. *The Supplementary Reading Assignment*. (Warwick and York: Baltimore, 1927)

²⁴ Robert B. Weaver. "Extensive and intensive methods in history." *Historical Outlook*, 23: October, 1932, 292-296.

^{24a} For accounts of further studies, like the theses of Douglass, Freeble, and others, see Florence R. Tryon. "Directing Pupils' Study in the Social Studies." *Eighth Yearbook of the National Council for the Social Studies*, 1937. Chapter IV.

3. Needed Studies in the Field of Method

Two areas in which research has only begun, but in which it is needed and may affect practice very deeply, are (1) pupil participation in school government and extra-curricular activities as a means of achieving social-studies outcomes, and (2) the adjustment of methodology to differences such as exist between superior and less capable pupils. In respect to the first, a few studies have been made that are sufficiently promising to warrant further studies. In the case of the latter, the relative merits of supervised study for lower and upper groups have been assayed, and general descriptive studies of present and promising practices in caring for superior or for less capable pupils generally are available.²⁵ Obviously, the whole range of studies in individual differences has here affected somewhat practices in social-studies teaching.

One has to conclude, in respect to the relation of research to method in teaching the social studies that the work has been stimulative, that it has prodded 'the passing of the recitation,' but that it has not produced convincing formulas for a new and superior methodology. Existing confusion in practices of teaching is matched by confusion in the conclusions of research.

III. MATERIALS AND EQUIPMENT USED IN THE SOCIAL STUDIES

There has been an unmistakable trend since the beginning of the present century toward a greatly increased utilization of physical equipment to aid in social-studies instruction. Although this increased use has unquestionably been due to a great many different factors—including some transient enthusiasms, fads, and producers' salesmanship—educational research has played a significant rôle in pointing out the need for equipment and in showing its superior effectiveness in terms of pupil learning.

The recognition of the need for more equipment has grown out of the reaction against verbalism and the corresponding emphasis upon educational realism and the active nature of the learning process. These in turn are based upon a series of research studies in the field of the psychology of learning. Many of the 'new methods' of teaching—such

²⁵ See Samuel Steinberg. "The gifted child." *Historical Outlook*, 24: October and November, 1933, 314-318, 366-372; Thelma K. Paup. *An Analysis of the Methods Used in Teaching Social Studies to Superior Students* (Unpublished master's thesis, University of Southern California, 1933); Sharon S. Ulrey. *Diagnostic and Remedial Treatment of One Hundred Senior High School Pupils in European History*. (Doctoral dissertation, Northwestern University, 1934)

as the project method, contract method, and supervised study—have demanded, when applied to teaching the social studies, the utilization of more books in particular and more equipment in general.

1. The Effect of Research upon the Textbook and Supplementary Readers

The contributions of research that have borne directly upon social-studies equipment have been numerous. Nearly all of them have been focused upon some single item of equipment and have attempted to evaluate its usefulness. Most important of all these items of equipment is the textbook. This is true today, as it was a generation ago, although in recent years the particular qualities of textbooks have changed considerably. Textbooks now tend to be expanded narratives, containing many concrete illustrations, with style and vocabulary adjusted to pupil abilities. The increased length of textbooks can be ascribed largely to the findings of such research studies on the value of extensive over intensive reading as have been cited above. The inclusion of more concrete detail in books for younger children has resulted in part from such studies of learning as those of Lacey²⁶ and Meltzer²⁷ on children's acquisition of social concepts. A better gradation of vocabulary and style in social-studies textbooks has followed in the wake of research on word difficulty²⁸ and on style of writing.²⁹ Newer textbooks, in their tendency to override subject boundary lines and to utilize unitary organization, reflect the outcome of research on curricular reorganization already reviewed. Matters of type size and page format reflect the results of research. Quantitative analyses of textbook content have been both numerous and influential. Bagley and Rugg³⁰ in 1915 set the style for this type of analysis in a study showing

²⁶ Joy Muchmore Lacey. *Social Studies Concepts of Children in the First Three Grades*. Contributions to Education, No. 548. (Teachers College, Columbia University: New York, 1932)

²⁷ Hyman Meltzer. *Children's Social Concepts: A Study of Their Nature and Development*. Contributions to Education, No. 192. (Teachers College, Columbia University: New York, 1925)

²⁸ See studies cited above, Footnotes 12, 13, and 14. See also Horn, *Methods of Instruction in the Social Studies*, Ch. V.

²⁹ Adelaide Ayer. *Some Difficulties in Elementary School History*. Contributions to Education, No. 212. (Teachers College, Columbia University: New York, 1926); William S. Gray and Bernice E. Leary. *What Makes a Book Readable?* (University of Chicago Press: Chicago, 1935)

³⁰ W. C. Bagley and H. O. Rugg. *Content of American History as Taught in the Seventh and Eighth Grades*. Bulletin No. 16. (University of Illinois: Urbana, 1915)

trends as to space allotment for different kinds of content and for different chronological periods in American history texts. Many similar studies followed. In 1936 Levine evaluated history textbooks on both quantitative and qualitative bases.³¹ Studies of this type have shown their influence in recent tendencies to minimize the space given to military and political history and to increase the space given to economic, social, and recent history. Studies of pupils' interests and teachers' successful experiences have guided the inclusion of suggested pupil activities and reading lists, such as characterize current texts.³²

Books in social studies for supplementary reading have improved in ways similar to the changes in textbooks. Authors and publishers have profited from the results of educational research in making their products better adapted to pupil needs. Teachers, librarians, and administrators have expanded the size of social-studies libraries to provide for more extensive reading and for a greater range of pupil interests and abilities. Standards for selecting books for social-studies libraries have been made available through the research and book lists of Kimmel,³³ Swindler,³⁴ and others. Kepner, among others, has reported on the use of school libraries for social-studies work.³⁵ Similar research studies have conditioned the selection and utilization of periodical materials for social-studies classes. Price³⁶ has summarized teachers' opinions and procedures in this field and Sherrod³⁷ has provided indices for judging the vocabulary used in seventeen social-studies periodicals. Murra,^{37a} after reviewing the contradictory evidence from

³¹ Michael Levine. *A Critical Analysis and Evaluation of Selected Current Secondary-School Textbooks in American History in the Light of Educational Research*. (Doctoral dissertation, New York University, 1936)

³² H. E. Wilson. " 'Things to do' in the social-science classroom." *Historical Outlook*, 20: May, 1929, 218-224.

³³ William G. Kimmel. *The Management of the Reading Program in the Social Studies*. (Bulletin No. 4, National Council for the Social Studies, 1929)

³⁴ Robert E. Swindler. *Social-Studies Instruction*. (Prentice-Hall: New York, 1933). See also his article on "The Contribution of Research toward the Understanding and Solution of Collateral Reading Problems" in the *Eighth Yearbook of the National Council for the Social Studies*, 1937.

³⁵ Tyler Kepner. "History reading groups in the library." *Wilson Bulletin*, 10: April, 1936, 507-511, 549.

³⁶ Roy A. Price (Chairman). "The use of periodical literature in social-studies classrooms." *Social Studies*, 27: April, 1936, 223-232.

³⁷ C. C. Crawford and Rose Mary Sherrod. "The vocabulary levels of social-science magazines." *Social Studies*, 28: March, 1937, 115-117.

^{37a} Wilbur F. Murra. "Contributions of Research to the Teaching of Current Events." *Eighth Yearbook of the National Council for the Social Studies*, 1937. Chapter VIII.

research, concluded that the nature of the materials—clippings, pamphlets, periodicals—used in dealing with current events is not so important as the manner in which they are used.

2. Other Visual Aids

Appeals to the eye through objects, pictures, maps, and diagrammatic representations have for many generations accompanied good teaching of the social studies. Teachers and educational writers generally have agreed that visual materials are valuable aids to learning because of their power to give a sense of reality, to increase interest, to stimulate the imagination, and to effect other desirable outcomes. Although both the use of visual aids and the advancement of claims as to their value antedated the present century, it has remained for the last generation to test the validity of the claims and to measure the actual outcomes of their use. The results of research have largely justified the earlier claims and the promulgation of these results has served to increase and improve the use of visual aids in teaching the social studies.³⁸

A more striking phase of the influence of research upon practice during the past generation lies in the development of new kinds of visual aids made possible by the advances of technology. This reciprocal stimulation for growth between technical and educational research is best illustrated in the case of motion pictures. By the time of the World War, experimentation with lantern slides had already indicated something of the educational values of the classroom screen. Technology met the challenge implied in that experimentation and produced educational motion pictures. These pictures were immediately subjected to the scrutiny of educational research³⁹ and that in turn stimulated the production of more and better educational films. Within the past fifteen years a series of extensive and well-controlled investigations has studied the influence of motion pictures upon learning the social studies.⁴⁰ The results of these investigations have been generally favorable

³⁸ Annette Glick. "The use of visual aids in teaching the social studies—past and present." *Fifth Yearbook of the National Council for the Social Studies*, 1935, 123-142.

³⁹ For example, by David R. Sumstine. "A comparative study of visual instruction in the high school." *School and Society*, 7: February 23, 1918, 235-238.

⁴⁰ See F. N. Freeman (Editor). *Visual Education* (University of Chicago Press: Chicago), pp. 72-74; D. C. Knowlton and J. W. Tilton. *Motion Pictures in History Teaching* (Yale University Press: New Haven, 1929); and Ben D. Wood and Frank N. Freeman. *Motion Pictures in the Classroom*. (Houghton Mifflin Company: Boston, 1929)

to motion pictures—particularly when they are used in conjunction with other modes of instruction. It has been shown that films are more effective when used in a classroom with a single class than when used in the school auditorium for larger groups; that less able pupils profit more than brighter pupils; that voluntary reading is encouraged; and that retention is strengthened.⁴¹

3. Sound Films and the Radio

Since 1930 special attention has been devoted to the distinctive values of sound films. In the field of science teaching, Rulon⁴² found marked superiority for sound films; no such advantage has been demonstrated to pertain to social-studies subjects, but there have been some positive findings. After reviewing the experimental evidence, Horn is led to conclude that "expenditures for expensive sound equipment do not at present seem to be justified."⁴³ Meanwhile, producers are supplying more and better educational films, both sound and silent. Social-studies teachers and school administrators are becoming increasingly aware of the values to be derived from them, and their use is becoming more and more frequent, despite the handicap of cost.

Radio instruction as used at the present time is similar to motion pictures in that it represents the combined contribution of technology and educational research. Although it would be technically possible to make much greater use of the radio in school work than is at present being done, and although such research as has been carried out seems to demonstrate some positive values for radio, the actual school use of it is still very limited. Cost, inflexibility, and unsuitability of available school-time programs are barriers, and such use as there is, is partly attributed to the investigations that have been made. These have shown the advantages of radio broadcasts planned especially for school use when they are not isolated but are integrated with other forms of presentation.⁴⁴ The limitations of radio instruction are to be seen in such

⁴¹ For a more complete summary, see Ernest Horn. *Methods of Instruction in the Social Studies*, pp. 370-378.

⁴² Phillip J. Rulon. *The Sound Motion Picture in Science Teaching*. Harvard Studies in Education, Vol. 20. (Harvard University Press: Cambridge, 1933)

⁴³ Ernest Horn. *Op. cit.*, p. 376.

⁴⁴ See the yearbooks of the Institute for Education by Radio, all entitled *Education on the Air* (Ohio State University: Columbus, Ohio, 1930-). For a particularly admirable experiment on the use of radio broadcasts for teaching current events, see *The Wisconsin Experiment in Radio Education*. (University of Wisconsin: Madison, Wisconsin, 1930)

studies as Lumley's,⁴⁵ which shows the small percentage of retention and the large number of erroneous ideas resulting from listening to radio broadcasts.

IV. TESTING AND EVALUATION IN THE SOCIAL STUDIES

The whole educational testing movement has profoundly affected social-studies teaching during the last generation, just as it has affected every other field of instruction. It has impressed upon teachers the realities and the importance of individual differences and has furnished sound bases for pupil diagnosis and differentiated instruction. It has improved the accuracy of evaluation in social-studies instruction by making possible more precise measurement of more different instructional outcomes than had been possible earlier. This has come about both through the development of standardized tests and through better teacher-made examinations. And it has facilitated educational experimentation by providing indispensable measuring instruments.⁴⁶

The first phases of the modern testing movement were not an unmixed blessing for the social studies. New-type tests consisted almost exclusively of items measuring factual information alone. Tests of that kind were relatively easy to make, and their appearance was not surprising. However, they tended to focus social-studies instruction on memoriter outcomes; such a result, for example, is traceable in the Regents' Examinations in history in New York State. The social-studies, however, have emphasized other than memoriter outcomes, and there is evidence that the relatively recent development of tests focused on such outcomes as understandings, skills, and attitudes is affecting instruction rapidly. For illustration, since the State University of Iowa introduced a test of basic study skills into its annual testing program for Iowa schools, there seems to have been renewed emphasis on training pupils of the state in the performance of such skills. The work of evaluating mental operations and traits carried on under the direction of Ralph W. Tyler at Ohio State University is producing similar changes in emphasis in instruction in coöperating schools.⁴⁷

⁴⁵ Frederick L. Lumley. *Measurement in Radio*. (Ohio State University: Columbus, 1934)

⁴⁶ Ernest Horn. "Another chapter on tests for the volume of conclusions and recommendations." *Social Studies*, 26: January, 1935, 13-22.

⁴⁷ For a statement and brief bibliography of the type of evaluation that is carried on under Tyler's direction, see the *Fourteenth Yearbook of the Department of Superintendence*, 1936, Chapter XIII, pp. 312-343.

The development of new forms of new-type tests, then, has affected objectives and curricular emphases, and increasingly for the better. In addition, the rise of the testing movement and general research in that field have brought about, among teachers generally, testing practices that are aspects of method. Most teachers utilize to some advantage the forms of tests that have been developed. To be sure, the use has often been uncritical, but in recent years two developments have improved the situation. The first is the dissemination of knowledge as to methods for objective evaluation of test items—methods that have been developed by specialists but are usable by most classroom teachers.⁴⁸ The second is the publication of 'reservoirs of test items' that have been developed and scrutinized in research laboratories and that may be incorporated into specific tests by teachers.⁴⁹ There are in addition, of course, the new batteries of standardized tests, and the services of such agencies as the Coöperative Test Service.⁵⁰

V. CONCLUSION

One reaches the conclusion, after surveying social-studies instruction for the generation just past, that the achievements of research in psychology and in education at large have influenced practice in the teaching of social studies markedly. Within the social studies themselves, however, research achievements have not been so outstanding, primarily because of complexities and intangibles within that area of instruction. The influences of research on objectives and curricular content may be traced more for their stimulative than for their positive effects; within the field of methods research has produced relatively little of basic significance; in respect to equipment, especially in its tangible and sometimes mechanical aspects, considerable work has been done with positive conclusions and effects on practice. And especially in the field of testing and evaluation profitable research has affected testing practices directly and all other aspects of instruction indirectly, and has produced noteworthy tools for further investigation.

⁴⁸ See Edgar Wesley. *Teaching the Social Studies*. Pp. 588-593, and the bibliography on pp. 600-603. (D. C. Heath and Company: Boston, 1937)

⁴⁹ See Howard R. Anderson and E. F. Lindquist. *Selected Test Items in American History*. (Bulletin No. 6, National Council for the Social Studies, 1936)

⁵⁰ Since this chapter was written there has appeared an excellent summary of eighteen investigations; see J. W. Wrightstone. "Testing in the Social Studies." *Eighth Yearbook of the National Council for the Social Studies*, 1937. Chapter IX.

CHAPTER XIII

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: THE PRACTICAL ARTS¹

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I. DEFINITIONS

The practical arts, whether the term be narrowly or broadly interpreted, are now generally approved as appropriate for inclusion in the curriculum of American children. Beginnings were made only about five decades ago, however,—a half century characterized by great changes in the practical arts of daily adult life. There resulted a potpourri of experimentation in the schools, accompanied by a scramble to keep in the curriculum, a fight for adequate time and equipment, and an effort to find out what the work was all about. There was little time or inclination for research.

The present convention is to limit the term 'practical arts' to those simpler exercises that resemble and suggest what men and women do in the occupational areas called 'industry,' 'agriculture,' 'clerical occupations,' and 'domestic and personal callings.' These are essentially the great divisions of the whole field of practical arts in the schools. By convention this definition excludes on the lower level what may be called constructive play with tools and materials, and it excludes on the upper level actual preparation for a vocation, as well as the exercise of the vocation. Further, the term seems to exclude certain very practical 'professional arts,' such as music, art, dramatics, public speaking, and dancing.

¹ The Yearbook Committee is indebted to Professor Brewer for assembling this material on the practical arts on very short notice and at the twelfth hour. On account of the short time allowable, research projects bearing on the practical arts could not be listed fully.—F. N. F.

Most often the industrial arts are actually meant to be designated when the practical arts are named. This may be because other names are used in other areas. Gardening, 4-H clubs, 'junior business training,'² elementary business exercises, homecrafts, household arts, home projects—these with variations are sufficient. The vast area of industry (manufacturing and mechanical industries) includes, with similar work on the farm and in transportation, about sixty percent of all paid workers; hence the practical arts in school shops should deal primarily with exercises and projects drawn from industrial occupations:

II. AIMS OF THE PRACTICAL ARTS

Even the aim of practical arts was long in doubt. The exhibits of educational work submitted by the Russian government in the Centennial Exhibition started the interest among American educators, but bent it in the direction of processes, tools, and manipulation; this deflection led into the blind alley of 'general manual training,' through an array of dovetail joints and neatly processed, but useless, pieces of metal, utterly irrelevant to the practical. Swedish methods later brought forth so-called 'useful' articles, but the work was formalized: twenty boys, twenty simultaneous key racks, with little or no relationship either to the demand for the objects or to the life-aims and activities of the boys.

Before the dispute between these two systems was resolved, vocational guidance was inaugurated (1908), and began to demand a new aim: that the practical arts should serve to discover talents related to actual paid callings.

At the present writing both of the early aims are largely abandoned. Researches by Thorndike and others have made untenable the theory that skills practiced in the vacuum of unreality would transfer advantageously to life situations, and that hand and eye could be coördinated by means of exercises unrelated to obvious human aims and needs. (Curiously enough, the theory that school shops existed to train "the receptive faculty of observation," as advocated by one writer, had been pressed into service as a defense against the base charge that school shops were concerned with preparing for vocations!) Likewise the aim involved in having all the pupils working on the same object has suffered abandonment as the vision of the teachers widened and fear of disorder vanished.

²The use of the word *training* here and in 'manual training' is unjustified.

Three aims are now generally recognized, which may be stated as follows:

1. Practical arts are a wholesome recreational or hobby activity, useful throughout life.
2. Practical arts are valuable to future wives and husbands, in home-making and home maintenance.
3. Practical arts are valuable for vocational guidance: (a) they discover for some individuals the field of work into which they should enter; (b) they reveal to others lacks in interest and ability, and thus save further experimentation; (c) they serve to reveal technical ability related to engineering; (d) for certain pupils they serve to test ability for specific callings.

It would be an exaggeration to claim that these aims have been established by research; it would be nearer the fact to say that research helped to clear the way and that careful experiment and discussion have done the rest. What is much needed now are careful studies of the experiences of those persons who received the benefits of school work in the arts.

III. RESEARCH BEGINNINGS AND NEEDS

We are unable to assemble an authoritative list of researches in the field of practical arts. A recent article noted 94 bibliographical items in the industrial field alone.³ Some of the topics follow: shop methods, written *vs.* oral instructions, job sheets *vs.* operation sheets, shop lighting, shop noises, methods of teaching drawing, measuring mechanical ability, test results compared to shop results, effectiveness of demonstrations, changes of interest, consumer needs, organizing pupil personnel, the problem of centralized supervision.

A fruitful piece of early research in the commercial field was the report by Frederick G. Nichols, *A Survey of Junior Commercial Occupations in Sixteen States*.⁴ This study showed that the first jobs of young boys and girls were of the errand-boy and office-boy types; it served to help break the hold of bookkeeping and stenography as the basic initial studies of the commercial curriculum. It opened the way for a junior clerical course for explanatory and foundational purposes, quickly followed by another general clerical course to be used as a trial course leading to preparation in specific commercial callings.

Likewise, analyses of the tasks of farm and of home teased out

³ William E. Warner. "Industrial-arts research." *Industrial Arts and Vocational Education*, 24: Feb., 1935, 38-46.

⁴ Federal Board for Vocational Education, 1920.

items that contributed to the organization of good work in these two fields.

1. Research in the Aims of the Practical Arts

Much serious study of aims has now established the practical arts in a position between the early exercises of the elementary grades and formal preparation for the vocation. By a process of elimination the threefold aims stated above (II) have survived. Further testing through the checking of outcomes (see below) will determine whether this appraisal of aims will persist. Establishment as a permanent subject of the junior-high-school and senior-high-school curriculum will then be more secure.

Research in aims is needed to discover their relative importance for various groups of pupils. Attitude and competition must be taken into account. Thus, the future engineers may tend to dominate the general industrial shop, turning out the best work and outclassing the middle group—the very boys for whom the shopwork is most vitally important. Again, the pupils strong in academic studies may be influenced by indifference; on the other hand those weak in academic studies may be stimulated to make an abnormally good show of achievement, as a temporary compensation. These tendencies point to the need for studies of individual pupils.

2. Scope and Subject Matter

Industry, agriculture, commerce (clerical rather than 'trade'), and homemaking, as census groups, must be drawn upon for the subject matter of the practical arts. But how? If numbers of workers are to be a guide there would be little or no pattern-making and wood-turning, and there ought to be something of the needle trades for boys. In industry the building trades should be represented, other hand trades, and the metal trades, with a few exercises in rubber, leather, and cement. Both in farming and homemaking there are mechanical exercises that resemble the industrial. In commerce the clerical exercises are clearly defined.

Again, researches and experiences have shown that *repairs* should not be neglected, since they furnish projects vivid and purposeful beyond most, but that they should not dominate the time and effort, limiting applications to one rather narrow environment. The same principle governs the production in the printshop of job-work required by the board of education.

Exercises, it has been found, should be selected from the simpler tasks of the skilled occupations; this enables the pupil of great power to look up to engineering and the boys and girls of limited ability to look to semiskilled and unskilled callings.

3. Curriculum Construction

The general shop cannot, of course, be completely general. There is some point in having farm mechanics and home mechanics in the industrial shop, but homemaking exercises of the usual sort, gardening, and junior business exercises each belong in their own quarters. By common consent the term 'general shop' has been applied to the industrial group of exercises. In some cases it has been deemed wise, especially on the upper level, to maintain a general wood shop and a general metal shop. An eye on the census figures for skilled callings will aid in selecting the occupations to be represented, though to some authorities occupations like automobile mechanics, containing much unskilled work, seem better to be postponed beyond the junior-high-school age.

Job analysis is an aid in curriculum construction, in all the fields, and teachers have done much valuable work in it. The magazine literature is well supplied with analyses, both of adult callings and of the practical arts.

Differences between junior-high-school work and senior-high-school work are shown in the selection of projects for the two levels. While there is great overlapping in tables of maturity, it seems safe to say that the lower school needs a wider variety of explorations; the upper needs more definite trial opportunities as a vestibule to specific vocational curriculums. If the senior high school offers definite preparation in (1) agriculture, (2) four building trades, (3) three machine trades, (4) printing, (5) salesmanship, (6) three clerical callings, and (7) homemaking, we should be fair in saying that the junior high school might be expected to give the boy or girl a fairly good notion as to which of the seven sets of offerings he should elect; whereupon the first year of the senior high school might be devoted to a tryout within the framework of that one set of related callings, leading to specific preparation during the last two years.

Trial opportunities for older pupils in the actual occupational environment are now being experimented with.

Curriculums must of course contain a certain small amount of technical knowledge to be taught in connection with specific projects. Also,

since research has shown that lack of 'job-wisdom' is a potent cause of failure among workers, matters of morale, coöperation, and other such elements of success must be taught. Exploration and trial to bring out these personal qualities, as actually applied in work situations, are perhaps of paramount importance.

In this discussion we do not mean to lose sight of the recreational and husbandhood objectives of the practical arts; they ought to find legitimate outlet in a shop devoted to the vocational-guidance aim.

Matched with the shop exercises at their best should be two other curricular benefits, all three closely interwoven: classes in occupational information and opportunity for individual counsel.

4. Methods in the Practical Arts

Reports of many researches on classroom methods have been published. Oral supervision and instruction, job-sheets, blueprints, lesson sheets, lectures, project directions, the receipt method, the question-and-problem method—these and others have been tried by enterprising teachers. Different methods have their own specific values, depending on aim and circumstance.

Census of tools called for has sometimes been taken. Lists of tools and fixtures, carefully inventoried, have frequently been published.

5. Measuring Results

After a dozen hours of instruction some teachers have given a simple project as an examination: the construction of a pint cup or the setting in type of a small circular. The resulting objects may be arranged in series, after having been scored on a point system. Evaluations of progress may be made on the basis of this and other forms of tests, like tests of trade knowledge, picture, question, and puzzle tests, and the like.

The best test of all is yet to be made—a comprehensive follow-up of pupils to discover relationships between school accomplishments in the practical arts and subsequent vocational and other experiences.

6. The Question of Types of Ability

Progress of the practical arts in education has been hampered by early belief in a theory of types of children and bimodal distribution of talent. It was supposed, apparently with no experimental trial of the theory, that children could be divided into two groups, 'thing think-

ers' and 'idea thinkers.' Happily this error did not flourish for long. A simple research with a pile of report cards will expose it.

The heterogeneous character of an average group of general-shop boys lent color to the theory. There were boys strong in 'academics' who were quite indifferent to the opportunities of the 'manual training shop.' Another group, failures upstairs, entered with great zest upon the work and seemed to be doing well until close inspection of their work was made. Ericson⁵ reports a positive, but low, correlation between I.Q. and shop scores; doubtless a much higher correlation would result in a group with a homogeneous attitude toward the work.

7. Standard Testing

Testing in vocational guidance is just now characterized by a wealth of offerings by men who have rarely been careful enough to offer convincing data on norms, validity, and reliability, to say nothing of experimentation to show just whom the tests are designed to test. Tests for hiring workers are further advanced than are those for purposes of guidance. Only by large reliance on analogy can more than a very few tests be used, and results so obtained are dangerous to apply to the case of an individual boy or girl.

Fortunately, the exploratory course is itself a rough, but largely valid, test, and fortunately, too, such a course is useful to most boys and girls, regardless of the vocational aim. It has been stated, we think correctly, that the general clerical course gives both negative and positive guidance to a child on the problem of entering the clerical field, with one reservation: some few who succeed should still consider quite other occupations. In general, the same may be said for exposure to work in the exploratory shop.

8. Problems of Girls

Following up will in time offer better information for use in guiding girls. General industrial work is apparently not so necessary for them; skilled hand work for women, as shown in census figures, is closely related to tasks normal to the home. Doubtless some school experience in shop work would be valuable to the girls who will take the places of the million and a half women engaged in semiskilled factory work and the more than a hundred thousand in unskilled industrial work. And

⁵ Emanuel E. Ericson. *Teaching Problems in Industrial Arts*. Pp. 256-260. (The Manual Arts Press, 1930)

such experiences in school might save the present waste of enrollment in the commercial curriculum on the part of girls who will not possibly enter commercial callings.

Yet with two million skilled clerical women workers—stenographers, typists, bookkeepers, cashiers, and clerks—the junior business exploratory opportunities become of great importance. Much less importance need be given to exploratory work in agriculture; possibly the club work, if it can be extended to benefit city girls, will prove adequate. This same club work in agriculture extends its scope well into the field of homemaking. A household course, comprehensive in scope, should be available for all girls, and some of the work for boys too.

IV. THE MENTAL HYGIENE OF THE PRACTICAL ARTS

In certain schools the practical arts have been introduced as a prophylactic against the mental aberrations sometimes growing out of the vacuous nature of a life consisting merely of academic study and athletics. Without extending our discussion into the philosophy of life and that of work, the mention of this possibility may serve.

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CHAPTER XIV

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: MUSIC AND ART

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Changes in music and art education, and the relation of scientific study to these changes, are discussed here under two headings: (1) evolution of purposes and methods in music and art education, and (2) examples of the influence that research and experimentation have had upon music and art education.

I. EVOLUTION OF PURPOSES AND METHODS IN MUSIC AND ART EDUCATION

At the beginning of the twentieth century, music and art education were generally included in curricula,¹ but conformed in purpose and method to other education of that time. Music was offered largely to train pupils for congregational church singing and to provide means for "developing mental activity" and for "stimulating and lubricating the mental faculties."² Method in music disregarded the ability of many persons to engage in congregational or choral singing without extended, formal training in music notation; therefore, method in music education was devoted to the use of symbols rather than to singing. Art emerged from industrial drawing as an intellectual study to train pupils in observation, memory of forms, and the power to discriminate.³ Method in art recognized the expressional value of the subject, but followed such excessively formal procedures that few pupils achieved the ability to express themselves through this medium.

By 1915, education in music and art seems to have gone far ahead

¹ Walter Albert Jessup. *The Social Factors Affecting Special Supervision in the Public Schools of the United States*. P. 91. (Teachers College, Columbia University, Contributions to Education, No. 43: New York, 1911)

² *Ibid.*, pp. 18-19.

³ *Ibid.*, pp. 28-29.

of 1900 in the aims, methods, and materials, as judged by views current at the present time about these subjects. Music was offered to cultivate musical taste and desire, to develop fluency and quality in expression, and to develop social expression through ensemble activity.⁴ Art was offered to develop "an additional means of expression" and better social and personal taste in "house decoration, dress, and civic projects."⁵ More extensive offerings were included in both subjects, and procedures included, almost universally, choral singing, music appreciation, and special organizations in music, and at least some degree of coöperation with civic groups and correlation with allied school subjects in art. Leaders in both subjects, however, seemed willing to accept the somewhat negative individualistic aim of "harmless enjoyment" enunciated by Parker.⁶ This individualistic attitude was reflected in many of the actual practices reported by Koos at that time.⁷

At present, three aspects of music and art education are recognized: activity in it, learning about it, and witnessing it.⁸ Analyses of the psychological foundations for these three aspects have led to the following basic principles for educational practice:

1. The music or art program should provide an organized opportunity for esthetic experience.
2. The music or art program should provide an organized opportunity for social experience.
3. The music or art program should provide for the development of technical mastery.
4. The music or art program should provide for the acquisition of knowledge about these subjects.⁹

Consequently, purpose and method in present-day music and art education are expected to conform with this conception of the aspects and

⁴Leonard V. Koos. *The Administration of Secondary School Units*. Pp. 168-169. (The University of Chicago Press, Supplementary Educational Monographs, Vol. I, No. 3: Chicago, 1917)

⁵*Ibid.*, p. 163.

⁶Samuel Chester Parker. *Methods of Teaching in High Schools*. Chapter X. (Ginn and Company: Boston, 1915)

⁷*Op. cit.*

⁸For music, these aspects are set forth in the *Thirty-Fifth Yearbook, Part II*, of this Society; for art, in the *Bulletin of the Association of American Colleges*, 22: 1936, 553-568.

⁹For music, see the *Thirty-Fifth Yearbook, Part II*, of this Society, Chapter I, by James L. Mursell; for art, see Willis L. Uhl, "Æsthetics in Modern Education," *Proceedings of the Pacific Arts Association*, 1934, 33-42. (Stanford University: Pacific Arts Association, Daniel M. Mendelowitz, Secretary.)

basic principles. The effects of the scientific movement upon the changes during the past generation are described in the remainder of this account.

II. EXAMPLES OF THE INFLUENCE THAT RESEARCH AND EXPERIMENTATION HAVE HAD UPON MUSIC AND ART EDUCATION

1. Aims

Mental discipline as an aim has been abandoned in music and art education for the same reason that it has been abandoned in all other education: scientific research has made it invalid. Each of the four basic principles stated above is supported by scientific data.

First, organized opportunity for esthetic experience influences directly the physiological condition, and, hence indirectly, the behavior, of the person who witnesses music or art.¹⁰ Instead of incidental or formal intellectualistic experiences, organized opportunities that present favorable conditions for the arousal of emotional reactions have been found necessary for esthetic development.¹¹

Second, organized opportunity for social experience influences the esthetic reactions of the person who witnesses music or art.¹² Desirable group reactions follow the teacher's arousal of a favorable group attitude to the material presented.

Third, the development of technical mastery in music or art education depends on the relation of pupils' activity to expressive use, esthetic problems, and pupils' readiness for the activity.¹³

¹⁰ Charles Dierkerens. "Reactions to musical stimuli." *Psychological Bulletin*, 20: 1923, 173-199; and *The Influence of Music on Behavior*. (Princeton University Press: Princeton, N. J., 1926). See also Max Schoen, "The Esthetic Attitude in Music." *Psychological Monographs*, 39: 1928, 162-183 (University of Iowa Studies in Psychology, No. 12); M. H. Bird, *A Study in Aesthetics*. (Harvard University Press: Cambridge, 1932); and Katherine Gilbert. *Studies in Recent Esthetics*. (University of North Carolina Press: Chapel Hill, 1927)

¹¹ Helen Christianson. *Music and the Young Child*. 32 pp. (Association for Childhood Education, 1201 Sixteenth St., Washington, D. C. 1936) See also Belle Boas, V. Murphy, Victor E. D'Amico, and F. Strickler (Editors), *Art Education Today*. 118 pp. (Teachers College, Columbia University: New York, 1936); and John Dewey. *Art as Experience*. Chapter III. (Milton, Balch and Co.: New York, 1934)

¹² Gardner Murphy and Lois B. Murphy. *Experimental Social Psychology*. Pp. 499-501. (Harper and Brothers: New York, 1931)

¹³ *Thirty-Fifth Yearbook, Part II*, of this Society. Pp. 8-11 and Chapters VI-VII.

Fourth, the acquisition of knowledge about music and art is essential, but it should not, and also it need not, interfere with pupils' enjoyment.¹⁴

2. Children's Development

That esthetic development follows patterns analogous to the patterns that have been investigated more fully in reading and literary development is indicated by research and refined observation in both music and art. The study of children's foundation for early vocal development in music has shown that their individual differences must be recognized and that their musical experiences should be planned accordingly. Some children, for example, fail to sing because their voices are pitched too low for the class singing. When presented with songs pitched within the child's range, a non-singer becomes responsive.¹⁵ That no child is tone-deaf and that tonal discrimination can be improved by practice¹⁶ are additional points that have influenced school practice.

The development of esthetic taste has been found to depend not only on native equipment but also on the nature and the gradation of materials. The development of perceptual patterns in music, as the waltz or polka, assists the child in his experience with related music; the same is true for art, except, of course, that the perceptual patterns consist of designs, colors, and so on.¹⁷ Fundamentally, esthetic taste develops through interactions between a person and material that is presented to him. Since certain music and art materials are more difficult perceptually than others, materials that are simple perceptually should be presented and actually experienced first. Perceptually simple pictures and elements of pictures have been discovered and charted for both average and gifted pupils.¹⁸ In both music and art, children

¹⁴ *Ibid.*, 10. See also Guy T. Buswell. *How People Look at Pictures: A Study of the Psychology of Perception*. 198 pp. (The University of Chicago Press: Chicago, 1935)

¹⁵ Arthur T. Jersild and Sylvia F. Bienstock. "A study of the development of children's ability to sing." *Journal of Educational Psychology*, 25: 1934; 481-503.

¹⁶ Irene Hissen. "A new approach to music for young children." *Child Development*, 4: 1933, 308-317.

¹⁷ *Ibid.*, and Buswell, *op. cit.*

¹⁸ Eunice Hammer Waymack and Gordon Hendrickson. "Children's reactions as a basis for teaching picture appreciation." *Elementary School Journal*, 33: 1932, 268-276. Betty Lark-Horovitz. "On art appreciation of children." *Journal of Educational Research*, 31: 1937, 118-137.

indicate preferences for certain modern works that seem too unconventional to adults.¹⁹ These and similar conclusions show that, by studying pupils as well as materials, teachers have made effective use of recent research.²⁰

3. Curriculum and Methods

In both music and art, an issue, similar to the problem of "phonics or no phonics" in reading, has been studied, but not settled. In music, for example, certain leaders insist that the traditional emphasis upon music symbols leads to neglect of music experiences: the mechanics of reading music frustrate the development of music as an art. That most children can learn a song readily by listening and a little practice is obvious, these leaders assert. The substitution of singing for the symbols of singing would lead, they believe, to a nation of singers.²¹

An attempt has been made to meet the same kind of difficulty in drawing as it has been met in reading. Very young children were encouraged to make crude sketches freely as illustrations for their experiences in dramatization, story-telling, and reading. At the same grade-level, they were trained in more accurate art forms, which were synthesized later. By this combination of materials and methods, children are reported to have acquired adequate technique to satisfy their needs as they matured, and also to have continued interest in pictorial representation.²² As this report appeared at a time when exact measurement was the chief criterion of value, the procedure has affected school practice but little. The enormous increase in pupils' reading ability since the use of phonics, if and when needed, seems to indicate the need of a revolution in these related subjects.

The interdependence of school subjects has led recently to increased emphasis upon the usefulness of music and art. Integration comes from this emphasis. International understanding, for example, seems to be facilitated by using the music and art of various peoples to provide

¹⁹R. White and B. Johnson. "Children's choices in modern art." *Child Development*, 1: 1930, 347-349.

²⁰Garrett Hynson. "A note on art education." *Curriculum Journal*, 8: 1937, 320-322.

²¹Thomas W. Surette. "Music teaching in schools." *Progressive Education*, 7: 1930, 107-114.

Archibald T. Davison. "Sight-reading in music in the grades." *Harvard Educational Review*, 7: 1937, 7-8.

²²Walter Sargent and Elizabeth Miller. *How Children Learn to Draw*. (Ginn and Co.: Boston, 1936. 264 pp.)

"national tints of utterance."²³ Effects of this emphasis are shown by the heavy demands made upon art museums and upon school purchasing departments, when alert teachers attempt such integration.²⁴ Similar integration is facilitated by the numerous songs of many lands recently made available. Limitations of effective integration, however, should be recognized, since "association and mutual dependence are by no means synonymous."²⁵

Relationships of music and art materials and procedures to children's home and community life are now in striking contrast to those of 1900 or 1915. Indeed, one of the measures of effective music or art education is the extent to which pupils are affected when not guided or restricted by the school.²⁶

Music and art programs are also planned for schools on the basis of investigations of music experiences and interests of children shown during informal play outside the regular school.²⁷

This discussion of curriculum and methods indicates but few of the many directions in which school music and art are changing as a result of research and experimentation. Both subjects are amenable to investigation and subsequent modification in the modes and directions used in other subjects. Criteria for selecting music materials,²⁸ for example, are closely similar in experimental origin and application to criteria used in the selection of reading materials. Forces outside as well as inside the school have extended the music program to include band, orchestra, class instrumental lessons, and other music activities.²⁹

²³ *Thirty-Sixth Yearbook, Part I*, of this Society, Chapters XXIV-XXVII.

²⁴ Thomas Munro. "The art museum and the secondary school." *Progressive Education*, 14: 1937, 522-534. Philip N. Youtz. "Progressive education in the Brooklyn museums." *Ibid.*, 535-536. Sibyl Browne. "A cooperative art service." *Ibid.*, 537-538. W. S. Rusk. "Education through the fine arts." *Journal of Higher Education*, 7: 1936, 371-376.

²⁵ Peter W. Dykema. "Significant Relationships of Music to Other Subjects." *Thirty-Fifth Yearbook, Part II*, of this Society. Chapter III.

²⁶ Ethelwyn Bradish. "The supervision of art," Ch. XI in Willis L. Uhl, *The Supervision of Secondary Subjects*. (D. Appleton-Century Co.: New York, 1929) Edgar B. Gordon. "A program of music activities outside the school." *Thirty-Fifth Yearbook, Part II*, of this Society. Chapter XVIII.

²⁷ M. A. Whalen. "Music in an activity program." *Education*, 56: 1936, 535-537.

²⁸ Anne E. Pierce. "The Selection and Organization of Music Materials." *Thirty-Fifth Yearbook, Part II*, of this Society, Chapter XV.

²⁹ For detailed discussions of materials and methods, see the *Thirty-Fifth Yearbook, Part II*, of this Society; also William G. Whitford, *An Introduction to Art Education*. (D. Appleton-Century Co.: New York, 1929. 337 pp.)

4. Administration

The extension of music and art programs has led to administrative problems for purchasing departments, housing, scheduling, accrediting, pupil classification, and teacher training and selection. Instead of having a single room, modern schools have many rooms, and sometimes an entire floor devoted to music practice rooms and an auditorium.³⁰ The peculiar problems of administering music and art programs have been complicated recently by the development of radio and motion-picture facilities as related divisions of school work. This development has led, in turn, to the scientific study of school architecture in the few schools that have been equipped adequately and treated acoustically.

5. Measurement and Evaluation

The measurement and evaluation of pupils' fitness and achievement in music and art have changed during the last generation from entirely empirical standards to standards based on either exact research or critically formulated criteria.

Guidance in music and art is authentic, when based upon available tests, and when conducted by trained guides enables schools to judge pupils' fitness and to diagnose their difficulties.³¹ Such guidance is based upon measurement; it begins with the earliest manifestations of aptitudes; it acts negatively or positively upon children according to their aptitude; it is qualitative as well as quantitative, and it points the way for remedial work.³²

Achievement in music and art requires appraisal of pupils' interests and attitudes as well as their definitely measurable progress. Therefore, informal appraisal is attempted, as mentioned above, and many tests are of the inventory type.³³ Other achievement tests have been designed to measure knowledge and skill in these subjects by means

³⁰ L. C. Mohr. "Let us have music." *Nation's Schools*, 20: 1937, 50-51. See also *Thirty-Fifth Yearbook, Part II*, Section III, and further, Boas, Murphy, d'Amico, and Strickler, *op. cit.*

³¹ Carl E. Seashore. "The Discovery and Guidance of Musical Talent." *Thirty-Fourth Yearbook* of this Society, Chapter XXI; also Norman C. Meier. "Diagnosis in Art," *Ibid.*, Chapter XXII.

³² Carl E. Seashore. "Educational guidance in music." *School and Society*, 45: 1937, 385-393. Helmut Hungerland. "Self-discovery through painting and drawing." *Progressive Education*, 14: 1937, 260-267.

³³ Cf. Glenn Gildersleeve. "Standards and the Evaluation and Measurement of Achievement in Music." *Thirty-Fifth Yearbook, Part II*, Chapter XIX.

similar to those used in all other subjects. The refinement and critical use of criteria of achievement seem now to be even more imperative, however, than the formulation of standardized tests for the evaluation of esthetic development in creative ability and taste and in the desirable social concomitants of music and art.

CHAPTER XV

CONTRIBUTIONS OF RESEARCH TO SPECIAL METHODS: HOME ECONOMICS

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Within the past generation, the changes in emphasis and expansion in content of home economics have probably been greater than in any other area of education, with the exception of the social sciences. Progressive administrators and teachers are attempting to utilize the results of investigations to improve secondary and collegiate instruction in home economics, but the number of really significant studies, especially on the doctorate level, is still meager.

Although a few investigations were reported during the first decade of the present century, it was not until 1918, when Katharine Murdoch's *Measurement of Certain Elements in Hand Sewing* was published, that one finds an attempt to apply the techniques of objective measurement; and only within the past few years have fundamental problems been attacked with serious effort made to control the different factors and to utilize the methods of research.

I. STUDIES OF THE CURRICULUM

Most of the investigations in home-economics education have dealt with the curriculum; they have been made by state and city departments of education, by professional organizations, and by individuals in universities.

1. Activity Surveys

The Denver curriculum study¹ in 1925 was the forerunner of many other surveys undertaken to obtain information regarding home activities—what girls of different ages did, and what they liked to do. Most

¹ Research Monograph No. 1, Home Economics, Public Schools, Denver, Colorado, 1925.

of these studies collected data by means of questionnaires, checklists, or interviews.

Activity analyses have shown that home practices were very much alike, irrespective of whether the homes were rural or urban or what their geographical location, although there were marked variations among the homes in any group studied. In 1921 Charters had 300 home-makers and professional women keep detailed diaries of their activities and problems. On the basis of this and subsequent investigations, the curriculum of Stevens College at Columbia, Missouri, has been developed.

Analyses of the responsibilities of boys and men have indicated that they could profit from instruction in many aspects of home life. Sporadic attempts to offer such instruction have been so successful that the movement is growing with great rapidity, and progressive educators at both secondary and college levels are beginning to think of such courses as desirable for both sexes. The conclusions of Meade,² as a result of her study of primitive tribes in New Guinea, that most of the characteristics that we have considered to be the result of sex are instead the result of environmental influences, appear to offer a scientific basis for providing a similar type of education for both sexes, especially when it tends to help them solve personal and social problems and to make more satisfactory adjustments to family life.

There is evidence that the need for studying the value of instruction in home economics at the secondary level as preparation for wage-earning as well as home-making is beginning to be recognized. Two recent master's theses at the University of Tennessee deal with this problem, and other less formal studies are being carried on in several other states.

2. Studies of Interests and Attitudes

Tabulations of students' questions indicate that their interests during early adolescence center around themselves and their friends; they want to know how to be well dressed and attractive, how to behave in a socially acceptable manner, how to be popular, how to entertain their friends, and how to get along with their families. Later, their questions tend to relate to drinking, smoking, petting; to specific facts about sex, courtship, marriage, and the rearing of children; and to money management, especially as it affects family and husband-and-wife relations.

² Margaret Meade. *Sex and Temperament*. (William Morrow and Son: New York, 1935)

A study made in 1935 attempted to ascertain the attitudes of girls. While most of the attitudes deemed desirable by a group of adults were those held by the majority of the secondary-school girls studied, most of them admitted marked lack of poise and unwillingness to assume responsibility for leadership in any group activity. The validity of the technique used for determining girls' real attitudes was attested by the fact that when the study was repeated with Porto Rican girls in 1937, the findings were remarkably similar, except a few items related to customs that investigation showed were markedly different in the United States and in Porto Rico.

3. Opinions of College Administrators, Instructors, and Graduates Regarding Curricular Content

In a canvass of 1500 women graduates of southern colleges, Campbell³ found that the change most often suggested by the married women for the improvement of college curricula was the addition of home-economics courses.

Coon⁴ summarized curricular studies at the college level and showed that many findings were significant, although most investigations had been of an informal nature. Since so high a proportion of college women marry, one criterion for determining core curricular materials should be their probable value for home-making. For example, alumnae of Land-Grant Colleges indicated a definite desire for less physical science and more social science and esthetics. Lindquist, Hadley, and Morgan found that married women graduates felt their greatest problems related to the emotional and social development of their children and the maintenance of successful family life, especially when financial resources were inadequate.

Bell studied the frequency of occurrence in texts and references of chemistry terms and principles and obtained the opinions of teachers of foods and nutrition and chemistry experts regarding the chemistry vocabulary and principles that were important for home-economics students.⁵ She found, as did Hood, that many items appeared very

³Doak S. Campbell. *Problems in the Education of College Women*. (Field Study No. 6. George Peabody College, Nashville, Tennessee, 1933. 80 pp.)

⁴Beulah I. Coon. A survey of studies related to the college curriculum in home economics. *Journal of Home Economics*, 29: 1937, 78-87, 154-60.

⁵Viola M. Bell. *Chemistry Used in Foods and Nutrition Courses*. (Bureau of Educational Research Monograph, No. 21, Ohio State University: Columbus, Ohio, 1935)

infrequently. The published list offers suggestions to teachers of service courses in chemistry and of foods and nutrition for determining curricular content and allocating responsibility for teaching specific material. The investigation did not attempt to study the extent to which students mastered the material regarded as essential by the experts, and it may well be that the content so regarded, especially in the case of non-majors, is too extensive to be mastered in the time this group is justified in devoting to chemistry.

In the main, curricular studies have been limited to tabulations of current practices or to the empirical judgments of more or less well qualified persons. Nevertheless, they have been largely responsible for certain modifications of the curriculum: decreased attention to the construction of clothes and more to their selection; preparation of meals, with emphasis upon nutrition and food habits as a substitute for cooking small amounts of isolated foods; increased emphasis upon art as it relates to the problems of ordinary persons; incorporation of material on consumer buying; some decrease in the emphasis upon physical and biological science at the college level; and greatly increased emphasis upon child development, personal and family life.

4. Home-making Education in the Core Curriculum

The trend toward regarding home economics as a part of the core curriculum rather than as a special subject for a particular group of girls has been accelerated by the findings of Spafford's study,⁶ in which she obtained the opinions of almost 600 teachers and administrators regarding the values of home economics and its functions in the present-day educational program. More than 90 percent of these educators believed home economics has a contribution to make to general education and two-thirds of them felt that this contribution could be made at every educational level. Apparently the majority of progressive administrators are willing to support home-economics teachers who want to develop a broad program that involves much more than training in a few limited skills.

II. EVALUATIONS OF CONTENT AND METHOD

An increasing number of investigations represent attempts to evaluate current practices.

⁶ Ivol Spafford. *The Contribution of Home Economics to General Education*. Chapter IV. (Unpublished doctoral dissertation, Ohio State University, 1935)

1. The Program of Vocational Education

One of the few attempts to evaluate the results of Federal subsidy for vocational education was made by Kent.⁷ She concluded that the programs of home-making education, organized under the national vocational education acts in twelve southern states, represented an orderly and consistent development within a relatively short time and that there had been a steadily increasing diffusion of leadership rather than a concentration of leadership in a purely administrative group, but she pointed out the need for experimentation and greater consideration of ways in which the program could be adapted to local situations.

The practices in institutions reimbursed from Federal funds for training home-economics teachers were studied by Blazier.⁸ Curricular offerings were evaluated by trainers of teachers and by alumnae. A composite picture is presented of curriculum, administrative practices, and apparent weaknesses and strengths of the program.

2. Effectiveness of Content and Different Methods of Teaching

Several studies have been made in the field of *related art*. Vaughn found that clothing instruction had a marked influence on girls' ability to select becoming and appropriate clothes, and Glenn found that such instruction resulted in significant gains on the McAdory Art Test. Russell, using the same instrument, concluded that this test had no predictive value and that students made decreasing gains in art judgment in successive art courses at the college level. Wentworth found that neither the McAdory nor the Meier-Seashore Art Judgment Test was as satisfactory to use with college students as the test she constructed, using an actual room, for measuring gains in recognizing artistic merit in house furnishing. She found, also, that gains were directly proportional to the emphasis upon this aspect of art in successive courses. A study at the University of Minnesota showed little correlation between the scores students made on questions measuring knowledge of art principles and those measuring ability to apply these principles in discriminating between what represents good taste and what represents poor taste.

⁷ Druzilla Kent. *A Study of the Results of Planning for Home-Economics Education in the Southern States*. Contributions to Education No. 689. (Teachers College, Columbia University, 1934. 208 pp.)

⁸ Florence Blazier. *Home Economics Education Courses*. Vocational Education Bulletin No. 187. (United States Department of the Interior, Office of Education, Washington. 1936. 101 pp.)

Some few persons have studied the relative effectiveness of different *methods of teaching*, but usually too few cases were included and conditions were not well enough controlled to make the studies highly significant. Several of these suggest that it is possible to reduce the amount of laboratory instruction at the secondary level without disastrous results.

III. LONG-TIME RESEARCH PROJECTS

The value of long-time research projects is beginning to be recognized in a few institutions. A series of studies, conducted at Iowa State College, have shown the development of the home-economics program in that institution and in the secondary schools of Iowa, the effect of home-economics training upon certain practices of married homemakers, and the prognostic value of various types of institutional records.

A detailed analysis was made of examinations used during 1932-35 in the field of euthenics in the General College at the University of Minnesota⁹ in an attempt to discover (1) what was actually being taught; (2) the extent to which comprehensive examinations sampled the vocabulary, facts, and principles taught; (3) the types of abilities measured; (4) the influence of syllabi; (5) the effect of recency of learning upon retention; and (6) the discriminating power of different types of questions. It was clearly shown that there should be a reduction in reading assignments and that bibliographies should be carefully annotated. Consistent improvement was shown in the mechanics of evaluation and progress toward testing judgment and the ability to apply what had been learned in new situations.

For the past five years there has been under way at the University of Minnesota an investigation dealing with many aspects of the problem of prerequisites at the college level. It began with the study by Hood¹⁰ on the contribution of chemistry to sequent courses in home economics. The outcome indicated that institutions did not agree as to the nature and amount of chemistry that should be required; that experts did not agree as to what chemistry content had applications in

⁹ *The Effective General College Curriculum as Revealed by Examinations*, Chapter VII. (Committee on Educational Research, University of Minnesota Press. 1937)

¹⁰ Grace Gordon Hood. *The Content of Prerequisite Chemistry Courses in Relation to the Content of Undergraduate Courses in Home Economics*. (Doctoral dissertation. University of Minnesota, Minneapolis, 1934. 121 pp.)

home economics; that much of the content of elementary chemistry was never mastered by the majority of the students; and that the ability to apply the concepts of chemistry in the home-economics setting was more dependent upon general scholastic ability than upon achievement in the prerequisite chemistry courses.

The Minnesota prerequisite investigation has already dealt with some 2000 students, and it will be continued for at least two more years if funds are available. To date the following conclusions have been reached:

1. The number of technical terms in the biological and physical sciences, as they are ordinarily taught, is excessive; and relatively few of the terms are common to prerequisite and sequent courses.¹¹

2. Laboratory practice is not essential to the understanding of scientific principles.¹²

3. Students who have not met certain prerequisite requirements seem to succeed as well in sequent courses as those who have. Hence prerequisites should be determined on the basis of their proved contribution to courses which may follow.

4. The possession of factual knowledge does not guarantee that students will be able to apply it.

5. There is slight relation between the extent of previous training and experience in food preparation and the quality of food products students cook or their skill in laboratory management; or between their knowledge of scientific principles and skill in food preparation or management.

6. A reasonable level of skill can apparently be attained in less time if students are given opportunities for self-direction and are supplied with objective devices by means of which to measure their attainment and progress.

7. It is possible to develop techniques whereby one can measure interest in ultimate goals.¹³

The implications of these findings have already brought about curricular modifications, an increased flexibility of schedules, and the development of an experimental attitude toward subject matter and teaching procedures on the part of those who have coöperated in the investigation. Such findings also suggest the feasibility of marked reductions in the amount of physical and biological science required for

¹¹ Clara M. Brown and Others. *Technical Vocabulary of Certain Science Courses in the University of Minnesota*. (Committee on Educational Research, Minneapolis, 1934. 110 pp.)

¹² Clara M. Brown and Others. *An Experiment in Biological Science Courses at the University of Minnesota*. (Unpublished study. 1937. 41 pp.)

¹³ Clara M. Brown and Lillian Butler. "An Experimental Study of Courses in Food Preparation at the University of Minnesota." (Unpublished study. 1937)

home-economics students, thereby making it possible to develop a core curriculum that will more nearly meet the needs of the majority of students.

IV. DEVELOPMENT OF SPECIFIC TECHNIQUES OF INVESTIGATION

Numerous measurement devices have been developed for evaluating management ability in food preparation, quality of workmanship on garments, quality of food products, personal qualities, teaching ability, and the recognition of artistic merit in house design and furnishing. The values of these devices are only beginning to be recognized by most teachers, but apparently they serve to clarify goals for students and enable them to reach satisfactory standards more quickly than they can otherwise. Some of the devices are invaluable in evaluating skills that cannot be measured at all by means of pencil-and-paper tests. Through their use it is now possible to determine the relative effectiveness of different content and methods in a given aspect of work, so that one need no longer be dependent upon subjective judgment. The development of valid and objective devices like these will also stimulate experimentation generally in home economics.

CHAPTER XVI

CONTRIBUTIONS OF RESEARCH TO THE CLASSIFICATION, PROMOTION, MARKING, AND CERTIFICATION OF PUPILS

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I. CLASSIFICATION

Classification exists whenever there is a system of classes or groups; it is found within the public schools wherever groups are brought together for instructional purposes. The graded system as represented by Grades I to XII was an attempt to classify pupils upon the basis of their mastery of certain minimal essentials of subject matter in order that group instruction could more readily take place. Originally such classification seemed necessary in order to educate with greater administrative facility the large numbers of pupils who were seeking an education; later it became evident that such classification was also necessary for the proper social development of the youths to be educated.

Important developments relative to both the theory and the practice of classification have taken place within the past few decades: (1) grade groups have become far less homogeneous than formerly; (2) ability grouping has become widely accepted; (3) the lack of complete homogeneity within ability groups has been better recognized; (4) increased recognition has been given to the fact that ability grouping is just a first step in trying to solve the problem of caring more adequately for individual differences; (5) the importance of adjusting methods and curricula to ability-group levels has been more widely recognized; (6) evaluation of ability grouping has shifted from the collection of opinions to the setting up of controlled experiments.

Each of these will be considered in more detail in what follows:

1. Heterogeneity of Grade Groups

The development and use of standardized achievement and mental tests during the past two decades have forced teachers and administrators to recognize that wide differences exist among children of the same grade. Baker (5)¹ presents such evidence, and his results are but typical of the great differences discovered among school children of a given grade by a large number of investigators.

2. Spread of Ability Grouping

The growing realization on the part of teachers and administrators of these pupil differences unquestionably was responsible for the present-day emphasis upon ability grouping. Buckingham and others in Ohio (11) presented evidence of considerable interest on this point as early as 1924. Otto (14) showed that 235 cities, of 292 having populations of 10,000 and more, used ability grouping in 1926. Billett (7) gathered data in 1930 showing that, of 8,594 high schools reporting, 2,740 provided for ability grouping; in a detailed study of 289 selected high schools, he found that 46 percent of the pupils of these schools were taught in ability groups. Such surveys present evidence to show that ability grouping had gained a wide acceptance as much as a decade ago. Billett's data are significant since they show such acceptance at a level where ability grouping is most difficult to administer.

This development has taken place despite many arguments against ability grouping that have been advanced with considerable fervor by its opponents. Many of these arguments in turn have been used by proponents of grouping. Nowhere is this more clearly shown than in the *Twenty-Fifth Yearbook* of this Society (17). Opponents argue that grouping implies a dead level of uniformity in the teaching of all pupils so grouped, whereas, they say, such pupils are inherently unlike and require much individual attention and instruction (18). Proponents insist that heterogeneity creates an almost impossible situation in which to provide for individual differences; just as much interested in adjusting school work to individual needs, they assert that this can be best accomplished when pupils are grouped upon the basis of the ability exhibited by the child in a given area of instruction. Both groups, likewise, argue that their point of view is the more democratic way of educating youths.

¹See numbered references at the end of this chapter.

From the point of view of theory, we seem to have reached a stalemate. Research, however, has yielded a somewhat better understanding of the problem, despite the inadequacy of present findings. Billett, after a most careful analysis both of writings and of controlled experimental research from the beginnings of the century until the early thirties, concludes that, to be most effective, the modern secondary school, among other groupings, should have "classroom groups with much less than chance heterogeneity among the pupils composing each group, in the rates, levels, and potential degrees of complexity of those aspects of educative growth that it is the purpose of the particular classroom activity to promote." This decrease in heterogeneity may in one group be achieved by segregation on the basis of mental ability; in another, by grouping on the basis of some special ability; and in another, on the basis of "interests, needs, or aims."

Experiments in general seem to indicate, despite certain contradictory evidence, that children of low I.Q. succeed better when classified into groups of homogeneous ability than when grouped heterogeneously; evidence is not so clear with respect to children of average and of superior ability. Experimental evidence here seems to point in both directions, with perhaps a slight tendency favorable to grouping.

This inconclusiveness seems to be due to at least two conditions in experimental technique. First, the bases of grouping and the factors controlled have varied so greatly from study to study that seemingly similar studies are often actually anything but similar. Second, the procedures so often followed by the experimental groups of average and of gifted children have been so confined to typical curricula, methods, and measurement that one might have guessed at the beginning that the control groups would do just as well as the experimental. Billett's experiment (6) is illustrative; he finds that the slow do better when grouped. His methods, curricula, and devices for measurement tended to hold the experimental groups of average and of bright children within such bounds that they were unable to take advantage of grouping to achieve more. He does show convincingly, however, that if able youths are merely grouped and no adaptation is made in techniques and curricula, then measurements based upon the minimal essentials of the course of study for children of lower I.Q. do not indicate any advantage in ability grouping for children of high I.Q. Studies are needed to show what results could be achieved if changes in curricula and methods were made in accordance with the ability of the group

and measuring instruments were devised that would more adequately measure what these abler students are able to achieve.

3. Lack of Complete Homogeneity More Fully Recognized

Formerly it was assumed that children grouped according to their ability to do the work of a given school grade constituted a homogeneous group. The fallacy of such an assumption is today clearly recognized, even by the most ardent advocates of ability, or 'homogeneous,' grouping. Boyer (9), for example, points out that, even when children are classified according to mental ability, they are by no means wholly homogeneous, although they are far less heterogeneous. Since heterogeneity has merely been reduced and not eliminated, courses of study for these ability groups "should in no case be viewed as rigid and inflexible instructions for standardizing teaching procedure." "The teacher," says Boyer, "is free to depart in making those finer adjustments necessary to effective learning." Evidence of this lack of homogeneity is apparent in the measured results of almost any ability group (18). All this makes it surprising that some theorists even yet argue against ability grouping upon the assumption that proponents of the plan assume that they have homogeneous groups. Such argument has in it something of the 'straw man' idea.

4. Ability Grouping Just a First Step

Since ability groups are merely less heterogeneous groups, grouping is obviously only a first step in taking care of individual differences. This development is the logical outcome of the results of research in the analysis of pupil abilities and interests. A reading of the *Thirty-Fifth Yearbook* (17) and of Bulletin No. 17, 1932, of the Office of Education (7) furnishes rather good evidence that practice is definitely accepting this point of view.

5. The Need of Adjusting Methods and Curricula

If we have ability groups in which approximately the middle 60 percent of the juvenile population of school age appear in the average group, there remain 20 percent in both the slow and bright groups. Upon this basis what development has taken place in practice with respect to needed adjustments in methods and curricula for the extreme groups? Respecting the dull, we have happily struck a middle ground somewhere between the two extreme original conceptions, one of which

assumed that the dull were wholly unable to learn and the school's responsibility was merely to keep them 'busy' and happy, and the other of which assumed that the dull could master the regular course of study if given time enough. Today we know that these children can be taught considerable academic material, but we also know that this material needs to be reconstructed for them. The vocabulary must be adjusted to their mental level, whereas the ideas must be adjusted to their social level. Baker (4, 5) has given considerable attention to this problem as well as to what should be done for the gifted. He says of the gifted that they are "able to think in symbols—rather than in the specific data," their learning "is characterized by versatility in the use of mental processes," they "prefer long-time units of work," they have "desirable powers of self-criticism," and "they dislike too much concrete routine" He enumerates many other characteristics that make it advisable to deal somewhat differently with the gifted than with other children. This point of view is gaining acceptance, as a review of school practice shows (7, 15, 17).²

6. Basis for the Evaluation of Grouping

Billett (7) in a careful analysis of literature discovered 141 articles dealing with ability grouping during the period from 1910 until 1928. His analysis shows one study in 1910; no other appeared until 1917. Forty-eight appeared during the six years from 1917 to 1922, but all were theoretical discussions or experimental studies not permitting full control of all factors. Not until 1924 did a study with carefully equated control and experimental groups appear (13). During the next few years there appeared Purdom's in 1925, Martin's and Baird's in 1927, Worlton's in 1928, Tharp's and Billett's in 1929, and Rankin's in 1931. These eight studies have dealt with English, history, mathematics, French, and general science; most of them were confined to Grades VII and IX; the number of pupils involved varied from 90 to 700; and in all but two studies, in which a year was used, the length of the ex-

²Prior to the work of Baker appeared T. S. Henry. *Classroom Problems in the Education of Gifted Children* (Nineteenth Yearbook, Part II, 1920, of this Society), an important contribution based upon the work of an experimental class at Urbana, Illinois. Whipple's *Classes for Gifted Children* (Public School Publishing Co.: Bloomington, Illinois, 1919), which was an outgrowth of the same experimental work, likewise presented an array of comparisons between gifted and average pupils.—*Editor*.

perimental period was one semester. Even though these eight studies were experiments in which carefully controlled and experimental groups were established, the degree of control varied so much from study to study that Billett (7) concludes "that no two of these investigations are analogous or coextensive, much less sufficiently similar to justify any expected identity of results." We have come a long way from judging the results of grouping upon just the opinion of individuals, but controlled experiment has to travel even farther before we have convincing objective data relative to the value of ability grouping. We are traveling in that direction, however, and the next two decades may provide the needed data.

II. PROMOTION

Ability grouping has doubtless had considerable influence upon certain developments related to promotions. These are: (1) the shift from annual to semi-annual or quarterly promotions and back again to annual; (2) a tendency to fail fewer pupils, extending even to 100 percent promotions; (3) promotion by subject rather than by grade; (4) emphasis upon enrichment rather than upon rapid progress for superior pupils; (5) a consideration of many factors rather than only a few in deciding whether or not to promote children; and (6) an expenditure of considerable effort in attempting to prevent failure (1, 3, 16).

1. Annual to Semi-Annual Promotions and Back Again

The problem of annual versus semi-annual promotions has been with us ever since W. T. Harris of St. Louis proposed semi-annual and then quarterly promotions as a means of adjusting the school program more effectively to individual differences among children. Many small school systems never did adopt semi-annual promotions. Billett (7) points out that yearly promotions are "characteristic of small schools and promotions each semester are characteristic of large schools." His data show that 90 percent of the high schools with enrollments of 51 to 100 pupils promote annually, whereas only 18 percent with enrollments of over 1000 do so. In a survey of elementary schools, Chism (12) found that, of 490 cities, 55.7 percent promoted annually. These 490 cities, of course, include a great many relatively small ones.

Although semi-annual promotion was originally advanced as a means of making it possible to deal more effectively with individual

differences among children, Ayer (3) finds evidence of its effectiveness for this purpose very inconclusive. In another survey (1) of conditions relative to semi-annual promotions, he finds it "apparently on the wane." At a time when retardation was great, due to unusually high standards of academic achievement and to curricular requirements that were fixed and inflexible, it seemed that semi-annual promotions might lessen retardation, since the child would repeat only a half year of work. Increased interest, however, in providing for individual differences by means of ability grouping, individual instruction, and greater emphasis upon the notion that we must consider the 'whole' child in adjusting our school program to his needs, has made it much less necessary to utilize semi-annual promotions. Such promotions, moreover, increase greatly the administrative difficulties of providing ability grouping, since they double the number of grade groups.

2. One Hundred Percent Promotions

As we said, the proposal for semi-annual promotions was closely related to the large amount of retardation found in the public schools; most of this was due to non-promotion and all such children were forced to repeat a whole year's work under the annual plan. The amount of retardation was estimated upon two bases; the one was based upon age-grade studies and the other upon grade-progress studies. Despite variations in procedures that made different investigations not comparable, these early studies agreed in showing large percentages of retardation in the grades. Ayer (1) presents a review of research substantiating such conditions. But in recent years a change can be noted. We are hearing more and more about 100 percent promotions. Ayer (1) says that many "school reports and a number of special studies indicate that actual retardation is decreasing." Boyer (9) remarks: "Present promotion practices are everywhere tending to eliminate the repetition of grades and thus to reduce still further the range of chronological age within a grade." This tendency to advance pupils through the grades upon the basis of age would seem to eliminate entirely the necessity for semi-annual promotions; it would, however, seem to put a further emphasis upon the necessity for ability grouping among these new age groups.

There has been an interesting development in this concept of 100 percent promotions. As used by Buckingham (10) in his original investigation at Decatur and Springfield, Illinois, it really meant trial

promotions, in that all pupils had to make good within the first six weeks of the new term. It differed in that 100 percent of the class group actually moved forward into the next grade; it was considered possible that every child had a chance to succeed in the new grade. He showed that approximately 70 percent of all pupils recommended for failure by the sending teacher made good when given a chance in the new grade. He also showed that very few of those recommended for failure one semester were again recommended the succeeding semester, but that largely a new group appeared. In more recent years the trial promotion idea has been sloughed off and the expression has been used to mean the actual sending of pupils forward grade by grade upon the basis of chronological age rather than upon the basis of an arbitrary standard of performance determined by the teacher in charge of the grade. This notion was approached by Cleveland a few years ago when a plan was instituted of sending forward to the seventh grade in the junior high school each child as soon as he reached 14 years of age regardless of his grade standing. This type of 100-percent promotion is what Boyer clearly means when he talks of "regular advance through the grades by years of chronological age . . . "

3. Promotion by Subject

Despite the almost universal practice in high schools of promoting by subject, this device is of relatively recent date. The ninth grade in many high schools did not promote by subject in the first two decades of the present century. Billett (7) shows that even yet, in 15 percent of the high schools in his investigation, the subject-matter unit of promotion means all the subjects of an entire grade and not the individual subject. Recently promotion by subject has reached down into the seventh and eighth grades as they have become parts of the junior high school. Such promotion methods reduce still further the need for semi-annual promotions.

4. Enrichment Favored for Children of Superior Ability

When classes were first formed for children of high I.Q., much was said about saving time and making it possible for these able youths to finish the high school and the college sooner. The Cambridge and Portland parallel courses covering the eight-year elementary school did this; all special coaching that made possible skipping had this aim in mind; the first efforts at ability grouping were often urged upon the basis of

making it possible for bright children to complete a grade in less than a year; and permission to carry extra subjects in the high school, so as to complete the customary 16 units in two and one-half or three years instead of four years, was consonant with the same aim.

Today we find that, theoretically at least, the idea of enrichment is gaining in favor. Special classes for children of high I.Q., the use of ability grouping, and the recognition of the necessity for differentiated courses for the dull, average, and bright have caused school men to recognize the wide opportunity for growth that programs of enrichment provide for the able child. As yet, evidence is lacking to show which method of educating superior children; that is, rapid advancement or enrichment, is best. Research based upon most carefully controlled experiments is needed. The problem is difficult because its solution requires not only measures of the ability of the gifted to deal with the minimal subject matter provided for the control group but also measures of the increased experience that they may gain from the enriched program. To create measuring sticks that will measure these achievements and at the same time measure what, if anything, the control group may have gained by their own initiative during the free time not occupied by the activities of the enriched program, is the problem. Investigators of ability grouping have, of course, been confronted by identically the same problem in determining whether or not gifted children profit from grouping.

6. Efforts to Prevent Failure

From the traditional notion that the school has something to give and that it is the pupil's fault if he doesn't get it, we have come a long distance. Formerly the teacher felt he had done his duty after he had lectured well; it was the concern of his pupils to get what they could. It was generally assumed that they could get it if they would. Typical of present-day attitudes toward the problem is a sectional heading in Billett's report (7) entitled "Coöperative Efforts to Prevent Failure." He says, in discussing the programs of a number of high schools that responded to his request for data concerning how they handle problems of school failure: "Obviously . . . no pupil receives a failing mark until strenuous efforts have been expended in an attempt to bring his work up to a standard which merits promotion. In these endeavors many factors other than scholastic achievement are given careful attention."

Two changes may be noted with respect to our method of handling failure. First, teachers now are more frequently feeling a responsibility for the success of their pupils. They know that the conditions for learning, both within and without the child, must be right if effective learning is to take place. They recognize that as teachers they have a responsibility for seeing to it that those conditions are right. Second, teachers now recognize that an arbitrary percent rating must not automatically determine who is to fail. Research (1) has shown too plainly the variability in examinations and the unreliability in rating those examinations to give us general confidence in such a standard. We have, moreover, come to realize that many other factors besides academic achievement should be given weight in deciding whether or not a pupil should be promoted.

III. MARKING

One hesitates to suggest what developments are taking place with respect to marking. Studies are contradictory, but certain ideas seem worth nothing. There is a tendency (1) to define marks with greater care, (2) to rate, in some way, other traits than scholarship, (3) to reduce the number of symbols in the marking system, and (4) to establish different standards for different ability groups.

1. Better Definition

Past practice (and even much current practice) has provided poorly defined marks owing to at least three things. Teachers differ greatly in the factors to which they assign weight in determining the mark. Even if these factors were agreed upon, the means used to measure them are so subjective and unreliable that ratings will vary. Finally, even when measurements are fairly reliable, the standards of achievement held by individual teachers differ so greatly that one teacher may decide that none should receive an "A," whereas another may decide that 50 percent deserve that rating. Educational literature during the past three decades or more presents hundreds of researches pointing to such conditions. Ayer (3) and Bixler (8) have presented reviews of research that rather well establish these points.

The preceding remarks give clues to the development respecting a better definition of marks. With increasing frequency we encounter the assertion that marks must be based solely upon "scholastic attainment, not behavior." Second, we find that the objective examination is being

used much more extensively than a few years ago and that, even when it is not, more thought is being given by teachers to making their own examinations more reliable and more valid. Third, so much has been said in recent years about the significance of the normal curve in relation to the measurement of physical and mental traits that one may hope, though evidence seems to be lacking, that the standards held by teachers will shortly vary much less than in the past.

2. Rating Traits Other than Scholarship

It has long been recognized that there are many traits of importance in the all-round development of a child. In the past, however, these traits were frequently incorporated as a part of the school mark. As a result the mark was neither fish or fowl. No one but the teacher knew what went into it, and even she had this knowledge only at the time she gave the mark; some, indeed, are unkind enough to claim she didn't even have it then! This condition has so disgusted many educators that they are for banishing the mark entirely. Others insist that it still performs an important function when properly limited to academic achievement and when supplemented by other ratings of significance to the pupil's development.

3. Reducing the Number of Symbols

Those interested in school marks know only too well the development that has taken place with respect to symbols. The old percentage system with 100 as perfect and 70, or thereabout, as passing has been widely displaced by a five-point marking system. This shift was closely related to research dealing with the unreliability of teachers' marks. With unreliability so high, differences of 1, 2, or even 4 or 5 percent ceased to be significant. It seemed, therefore, much more worth while to group pupils in no more than 3, 5, or 7 divisions. Five divisions has gained most popularity according to Billett (7). For diagnostic and guidance purposes ratings have even assumed the form of descriptive accounts that point out in much detail the pupils' specific weaknesses and strengths from the point of view of subject achievement. These accounts usually describe significant character and personality traits and offer suggestions as to what might be done to help the youth. Such ratings are abundantly worth while and even indispensable in any program of pupil guidance—provided, of course, they are not perfunctorily done.

4. Varying the Standards for Different Ability Groups

As ability groups were organized, an immediate problem was faced of deciding how to give marks. Uniform standards meant that children in the slow groups would receive most of the low marks and children in the bright groups the high marks. There now seems to be a tendency to adjust the standards of marking to the ability of the group. Thus in Detroit the X, Y, and Z sections are rated upon the basis of their own ability group. Each level has an opportunity of making as many high marks as either of the other sections. In order properly to interpret the marks, subscripts are attached. A student, therefore, who receives an 'A' in the X group is given an 'A_x'; if he had been in the Z group, the mark would have been an 'A_z.' Yakima, Washington (7) uses a different device in its junior and senior high schools. Marks of A, B, C, D, and E are given to the bright section; B, C, D, E, and F are marks for the average sections; and C, D, E, F, and G are given to the slow sections. Still another device is to have a fractional subscript attached to the mark, such as A-1/7, where the seven denotes that there were seven ability groups in this grade or subject and where the one shows that the pupil was in the ablest of the seven groups. All of these devices are means better to interpret the symbols.

IV. CERTIFICATION

Ability grouping and its attendant theory of 100 percent promotion, thus making the various grades, for all practical purposes, chronological-age groupings instead of groupings based upon a mastery of certain subject materials, thrust upon us the problem what to do with youths when they have finally spent their twelve years in the public schools and have completed, therefore, the requirements for high-school graduation. Billett (7) offers some evidence that we are breaking away from the uniform certificate of graduation. Eight percent of the high schools reporting in his study give special certificates; five percent merely award certificates of attendance; Pawtucket, R. I., provides a certificate for each ability level; Los Angeles senior high schools provide either (a) a diploma of graduation, (b) a certificate of completion, or (c) a certificate of attendance. We find that other high schools provide a uniform diploma, but have typed upon it the subjects taken and the marks received; others have marked across the diploma certain identifying statements such as "recommended for college" or "not a college entrance course."

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CHAPTER XVII

CONTRIBUTIONS OF RESEARCH TO THE INDIVIDUALIZATION OF INSTRUCTION

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I. THE MEANING OF INDIVIDUALIZATION

Individualization, as one of the outstanding and developing trends of the education in the generation now ending, is unique in that, as a movement, it has no organized body of adherents, no systematic formulation of aims and purposes, no organic unity of structure and practice. Rather, individualization has been an involuntary evolution, an unwilling, undirected accretion of successful practices that, as a whole, consistently tend in a given direction and influence education on every level. Individualization owes its driving power to the vision and aggressiveness of individual enthusiasts for some particular form or detail of individualization—primarily, it rests on no systematic determination of means or ends. On the other hand, with each advance in scientific knowledge about education, each proponent of a particular device for individualization has been free to capitalize the contributions of scientific studies in any field. Further, each new scientific discovery or emphasis has given rise to new visions of what individualization might become and to new ways in which it might be achieved. Accordingly individualization quite properly finds a place in this yearbook in spite of the fact that its primary bases are philosophical rather than scientific.

By individualization is meant any increase in the adjustment of educational aims or practices to individual differences in child nature, whether such adjustment is in aims (Philosophy), goals, materials, and methods (Science); whether in school organization and operation (Administration); in curriculum and instructional materials (Supervision), or in pupil-teacher and pupil-pupil relationships (Teaching).

Individualization refers wholly to *the process* of adjustment and in no way to the product of that adjustment. That is, individualization does not aim to increase the ruggedness of an individual's individualism. On the contrary, a student may be *socialized* in thought and feeling by individualized methods and materials. It follows that holders of diverse philosophies of education, educationalists who are proceeding toward exactly opposite goals, may nevertheless agree in their desire and efforts to 'individualize' instruction.

II. THE EVOLUTION OF INDIVIDUALIZATION

For the purposes of this Yearbook a brief historical statement of the evolution of individualization during the present century will be presented, and at each step of advance the attempt will be made to point out both how the contributions from the scientific study of education have been utilized to further the purposes of those who wish to individualize and how the efforts and activities of individualization-alists have stimulated scientific research.

1. Early Recognition of Its Possibilities

The widespread and increasing recognition of the part played by individual differences in determining the outcomes of any educational procedure is peculiarly the product of scientific studies of human nature, studies made at first by psychologists and later by educationalists. Yet at the turn of the century, before the birth of the scientific movement in these fields, the vision of the potentialities of individualization was already complete in a master mind.¹ Similarly, before tests and measurements were out of their swaddling clothes a second master mind had evolved the individual lesson sheet and broken the lock step of the existing mass education.² Yet such achievements of genius would have remained unnoticed and unassimilated³ by the profession, had not the scientific study of education eventually focused public attention on the facts and the significance of individual differences. Intelligence tests, I.Q.'s, controversies over the part played by heredity and environ-

¹ Preston W. Search. *An Ideal School*. (D. Appleton-Century Co.: New York, 1903. 357 pp.)

² Frederick Burk. "Individual instruction versus the lock-step." *Sierra Educational News*, 13: July-August, 1917.

³ For instance, E. L. Thorndike's masterly presentation of the arguments for individualization have apparently been entirely without observable effect. See his *Education*, pp. 67-70. (The Macmillan Co.: New York, 1912)

ment at last made the profession conscious that efficiency in teaching is conditioned by the quality of the human nature taught. In 1900 it was commonly supposed that any child could learn anything as well as any other child if he would only apply himself with equal industry. Under such a conception of the potentialities of children, failure could only mean lack of effort and industry, both of which were considered to be indicative of lack of moral character. Hence the severity that prevailed in the school's condemnation of failure and in the punishments and discipline that the school administered.

2. Stimulation by the Results of Intelligence Tests

The concept of the existence of measurable differences in the capacities of children completely altered the situation. It supplied both point and method to new systems of classification and stimulated the development of differentiation of schools, curricula, and methods adjusted to individual needs. More important still, measurement of the mental ages of children and the attempts to adjust to observed differences inevitably led to a detailed study of how children at different age levels behave. Out of increasing knowledge was born diagnosis and remedial instruction.

The development of intelligence tests gave rise to psychological clinics as agencies of adjustment.⁴ Although the first fruits of such adjustments were largely administrative in the form of X-Y-Z groupings,⁵ special classes⁶ for the feeble-minded, the dull, or the brilliant children. Nevertheless, such developments are important instances of individualization. The use of group intelligence tests as an aid to classification in the army⁷ during the World War completed the education of the profession and the public alike to individual differences in capacity. Today it is hard to find a school in which some form of this type of adjustment to individual differences is not accepted practice.

⁴ L. Witmer. *The Psychological Clinic*, March 15, 1907, 4-7.

⁵ C. W. Odell. *An Annotated Bibliography Dealing with the Classification and Instruction of Pupils to Provide for Individual Differences*. (University of Illinois: Urbana, Illinois, 1923. 50 pages, 346 titles)

⁶ J. H. Van Sickle, L. Witmer, and L. P. Ayres. *Provision for Exceptional Children in Public Schools*. (U. S. Ed. Bulletin No. 461, 1911)

⁷ C. S. Yoakum and R. M. Yerkes. *Army Mental Tests*. (Henry Holt and Co.: New York, 1920, 303 pp.)

Intelligence Tests and Their Use. (Twenty-First Yearbook of this Society. Public School Publishing Company, 1922)

3. Special Types of Schools and Equipment

A second administrative attempt to adjust to individual differences has been the development of types of schools designed to minister to special groups of children. The beginning of the century found the kindergarten, the elementary school, and the high school well established, but since 1900 there has been a rapid differentiation of secondary education, the firm establishment of the junior high school,⁸ the beginnings of the development of the nursery school, and the departmentalization of all schools and levels of work. In place of the narrow prescribed curriculum of the 90's, today from college to elementary grades, provision is made for the individual to share by choice in the determination of work best suited to his interests and tastes.

Moreover, within school buildings themselves are to be found many evidences of thoughtful planning in terms of individual differences. Seats are movable and adjustable to wide variations in bodily dimensions, individual lockers are provided, adjustable lights and fixtures are replacing standardized mass patterns.⁹ A great variety of evidence proves that the movement for individualization affects more than instruction alone.

Probably the important factors in bringing about these changes are two: (1) the growing recognition that individuals have different capacities and needs, and (2) the scientific study of curricular materials made possible by the development of the measurement movement in education to which reference will now be made.

4. The Influence of the Measurement Movement

At the turn of the century the second great area of scientific endeavor in education was just taking shape. Rice¹⁰ brought from the psychological laboratories of Wundt the concept of measurement of human behavior and gave to it a new turn. He personally visited and gave, under fairly comparable conditions, the same examinations to children in different school systems. A little later Thorndike produced the first calibrated educational instrument for the measurement of an

⁸ *The Junior High School*. (Fifteenth Yearbook, Part III, of this Society. Public School Publishing Co.: Bloomington, Ill., 1916)

⁹ G. L. Spain, A. B. Moehlman, and F. W. Frostic. *The Public Elementary-School Plant*. (Rand, McNally & Co.: New York, 1930. 602 pp.)

¹⁰ Based on statements made in a personal interview. J. M. Rice. *Scientific Management in Education*. (Hinds, Noble, and Eldridge: New York, 1913. 282 pp.)

educational product and set the stage for the rapid development of tests in all fields and subjects.

The revelations of these first crude comparative testings, as with all subsequent work of this character, were interpreted as evidence of the inefficiency of school teaching.¹¹ For the range of score in each type of test and in each grade was, and is, enormous, and the overlappings from grade to grade vastly exceed the average annual progress from grade to grade. At the time efficiency was an ideal widely accepted in the engineering world; for a period it also dominated the thinking of investigators in education. One school survey after another brought new 'deficiencies' to light and emphasized the range of individual differences in achievements at all levels and subjects. Educational clinics, patterned after psychological clinics but called Departments of Educational Research, came into being as agencies for putting to practical use each discovery and each product of scientific investigation.¹²

III. IMPORTANT ASPECTS OF INDIVIDUALIZATION OF INSTRUCTION

1. The Improvement of Textbooks

Before very long, every phase of school work was being subjected to scientific investigation. Probably Thorndike was one of the first to stress the uselessness of much of the material found in the textbook of the nineteenth century, to give voice to what today is known as the need for the 'vitalization' of the curriculum. However, the work of Ayres in spelling¹³ and the determination of the thousand most frequently used words in written English started a movement that is primarily an attempt to adjust *curricular materials* to children's interests and needs. One has only to compare the textbooks of the 1900's with those of the present day in type, paper, illustrations, and content to see how greatly the scientific studies of education have modified the means and materials of instruction in the direction of consideration for individual differences.

For instance, a comparison of the fifth-grade reading materials published by two of the largest and best known of our school textbook

¹¹ S. A. Courtis. *Final Report*. (Committee of School Inquiry, New York City, 1913. Part II, pp. 389-546)

¹² *Measurement of Educational Products*. (Seventeenth Yearbook, Part II, of this Society. Public School Publishing Co.: Bloomington, Illinois, 1918)

¹³ L. P. Ayres. *A Measuring Scale for Ability in Spelling*. (Russell Sage Foundation: New York, 1915, 58 pp.)

publishing houses, one set dated 1900 and the other 1936, revealed the following differences.

<i>Element Compared</i>	<i>1900</i>	<i>1936</i>
Size	496 pages	480 pages
Illustrations	Woodcuts of artist's drawings of adult life, all in black and white	Half-tones or simple line drawings based on photographs of real life with many in color
Contents	Preachy stories of classical heroic action by adults—history, biography, mythology	Stories of child life and of child relationships to adult life—nature, industry, science, etc.
Vocabulary and Structure	Adult words and phrasing in a formal, artificial style	Vocabulary adjusted to measured development of children's reading abilities. Simple sentences, natural diction
Emphasis	Oral reading and declamation	Silent reading for pleasure and information
Use	Basic text only (one per child)	Basic text plus rich supplementary readers dealing with health, social life, science, art, industry, literature, travel, etc., presenting and interpreting nature, child life, and adult life throughout the world

Very similar changes may be noted in textbooks for arithmetic, geography, and other subjects. The changes in *simplicity* and *attractiveness* are most evident in the material for the beginning grades; on the high-school level the changes affect more profoundly content and purpose. On all levels the shift from the moralistic idealization of adult past to realistic concern for pupil interest, purposes, understanding of life activities, and plans for the future is striking evidence of the contribution that the scientific study of child needs and abilities has made.

In the use of these new materials the same tendency is even more clearly illustrated. In place of the uniform text in the hands of every child, today schools not only have special libraries from which children

draw books as needed, as adults do, but also, even in class work, a wealth of different texts is provided, and each individual *selects* in terms of his personal preferences and needs. Moreover, the school itself provides a great variety of facilities, special rooms of many sorts—gymnasiums, art rooms, music rooms, auditoriums, workshops, etc.,—in which not only is an enriched curriculum offered, but provision is also made for individual choice of activity and sequence. Naturally, widespread changes are taking place in every correlated school activity. Today, for instance, a nation-wide revision of the marking system is under way in the attempt to devise a system of evaluation that shall be fairer to the individual child—the device most favored at present is apparently a personal letter to parents from the teacher about each particular pupil.

2. Diagnostic and Remedial Teaching

Teachers, however, are not content merely to measure. Their task is to change children, and their demands for ‘reasons why’ led to innumerable studies to determine just how children learn and just what can be done to help them when they develop wrong methods of behavior.¹⁴ Increasingly, diagnostic and remedial teaching has been individualized by raising to the consciousness of the profession the facts that individual children fail for *very different reasons* and that for each particular cause a remedy must be found in terms of the subject-matter situation, the nature of the child, and the particular pattern adopted by the child. It marked a great step forward when it came to be generally recognized that a given subject did not inevitably benefit all students—that whether the study of Latin, for instance, contributes to the culture of an individual depends not upon one, but upon *three* factors; namely, the content taught, the method of teaching used, and the relationship between both and the *peculiar* nature and development of the individual child.

3. The Development of Practice Tests, Workbooks, and the Like

It was inevitable that the growth of such ideas should give rise eventually to the attempt to adjust completely subject matter and methods of learning to individual development and tastes. The writer's Practice Tests in Arithmetic were the first of a new type of instruc-

¹⁴ *Educational Diagnosis*. (Thirty-Fourth Yearbook of this Society. Public School Publishing Co.: Bloomington, Ill., 1935)

tional materials.¹⁵ They were at once standardized, diagnostic, self-instructive, and self-corrective. Each child in a large group could work on his own level, progress at his own rate, learn in his own way. Other diagnostic scales and practice devices soon made their appearance. By 1930 the term 'workbooks' had appeared in educational literature.¹⁶ Today practice tests, workbooks, units of instruction, and many similar types of materials make it possible to carry forward the education in knowledge and skill of large groups of children on the individual basis. Sometimes all children work through the same basic materials at their own rates, and as they finish the required work, take up personal projects that provide for social and enrichment activities; sometimes the more formal drill lessons are used as need arises in a general program of social and individual activities. But whatever the form used, today the country over, there is far more of individual activity with learning subordinated to *individual* needs and purposes than there was at the beginning of the century. In industry, too, the same idea has taken root. Self-instructive lesson sheets play a major part in the in-service training of many an industrial and business corporation.¹⁷

4. Special Administrative Plans for Individualization: Winnetka and Dalton

A unique illustration of the interplay of science and philosophy in developing individualization is presented by the Winnetka schools.¹⁸ The superintendent, Carleton Washburne, worked for a time with Burke and became a convert to the basic philosophy of individualization. As superintendent of schools at Winnetka, utilizing the products of the scientific studies of education, he was able to develop a two-way curriculum, half the day being given to the development of essential knowledges and skill, and half to social and individual activities designed to enrich the appreciations and culture of individuals. By careful research a system of individualized lesson sheets, standards, and methods of procedure were evolved to care for the formal training. At

¹⁵ Courtis Standard Practice Tests in Arithmetic. (World Book Co.: New York, 1912)

¹⁶ Society for Curriculum Study. *The Work Book*. April, 1935.

¹⁷ Overhead Lines Department. *Foreman's Manual*. (Detroit Edison Co., Detroit, Michigan)

¹⁸ C. W. Washburne. "Educational measurement as a key to individual instruction and promotion." *Journal of Educational Research*, 5: March, 1922, 195-206.

the same time provision was made for the careful coördination of the formal drill work and the activity program. The Winnetka plan has become widely known as an outstanding illustration of what thorough-going individualization based on scientific research can do for education.

On the other hand a second outstanding illustration of individualization, the Dalton Plan,¹⁹ has stressed rather the philosophic phases of education. Community living, freedom to pursue interests, and the contract plan have provided for as much or more individualization than does Winnetka without the formal standardization in terms of scientific research that is evident at Winnetka. In the Dalton schools the products of research are utilized, but are less in evidence, less easily observed in action, than in the Winnetka schools. Both systems have given rise to many research problems.

IV. THE EFFICACY OF INDIVIDUALIZATION

Is individualization effective? The attempts at appraisal have been many, but the evidence is not consistent. Those who believe in individualization seem able to find evidence of its success; those who do not, secure results of a different character. One important outcome of the attempt to determine the effects of individualization scientifically has been the realization that the conventional subject-matter tests and standards measure but a small part of the desirable products of individualization.²⁰ In terms of subject-matter efficiency, teaching effort, and cost, the individualized schools appear to hold their own with the more formal schools; at the same time to give richer products in terms of those aspects of individual development and culture that all progressive educators value.

V. THE OUTLOOK

What of the future? Have the limits of individualization been reached? Far from it. The movement has just begun. Already in-

¹⁹ Helen Parkhurst. *Education on the Dalton Plan*. (E. P. Dutton and Company: New York, 1922. 278 pp.)

²⁰ *Adapting the Schools to Individual Differences*. Twenty-Fourth Yearbook, Part II, of this Society, pp. 133-221. (Public School Publishing Company: Bloomington, Ill., 1925)

Commission on Relation of School and College. *Progressive Education Association, Thirty Schools Bulletin*. Ohio State University, Columbus, Ohio, No. 1, April, 1937, p. 4.

vestigations are under way that suggest that many of our current concepts must be revised and theories and methods constructed anew. So far measurement has been concerned with mass results; today longitudinal studies of the growth of individuals are bringing new concepts to light, concepts that undoubtedly will lead to further individualization and further change of aims and methods. It appears that not all the variation in grade achievements is caused by poor teaching; that individuals may have as fixed personal maxima in subject-matter development as in height and bodily dimensions. It may well be that the progress of the individual and the interpretation to be put upon his score in any test is to be judged in terms of individual growth standards and not in terms of mass norms. Further, it has been suggested by some that individual curricula providing for personal sequences in the arrangement and development of activities must be established before education can hope to become efficient. Peculiarly is this likely to be true in the field of character and personality development, the field in which today advances in measurement and scientific research are being most actively attempted. But whatever the future holds in the way of further developments, one thing is certain—the relation between philosophy and science illustrated by the past development of individualization will still hold. Further advances in individualization must await new scientific knowledge, which alone can make ideals effective. Contrariwise, with each achieved advance, new visions of further desirable individualizations are certain to arise.

CHAPTER XVIII

CONTRIBUTIONS OF RESEARCH TO DISCIPLINE AND CONTROL

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I. INTRODUCTORY

Whenever a group of teachers or principals has assembled during the past fifty years, the conversation usually has touched on the topic of discipline. Application blanks, too, still sometimes carry the question, invariably asked in earlier years: "Is he a good disciplinarian?"

The conception of discipline has changed with changing philosophy and practice and as a consequence of a limited number of objective studies. Once considered merely as a means of securing obedience to authority, discipline is increasingly being recognized as a way of attaining the best development possible for every pupil. The trend in this general direction, however, has not been straightforward and unwavering. In the same decade may be found both an appreciation of the most modern approaches to the problem of discipline and protests against the 'new discipline.'

In spite of this variation in theory and practice, three periods may be distinguished: (a) the period of compulsion, (b) the period of competition, and (c) the period of development.¹ In the first period obedience to arbitrary authority was demanded and enforced by physical brutality or forms of fault-finding and sarcasm. Children were expected to do the tasks set for them whether or not they understood the reasons for them. Physical or psychological force was used to compel performance. 'Discipline,' in this sense, was considered a prerequisite to educative growth.

In the second period motivation by competition was substituted for

¹ J. E. Morgan. "Making a man of himself: A sketch of three kinds of discipline." *Educational Review*, 68: 1924, 242-243.

motivation by fear. This form of discipline has many serious limitations. The child of low ability knows nothing but defeat; the gifted child may easily surpass his fellows but fall far short of doing the best of which he is capable; neither acquires the desire to do *his own best*.

In the third period the best development of every child is the goal; discipline is part of the developmental process. Thus considered, discipline merges with child study and adjustment, with guidance, with the individualization of education, with the emphasis on mental hygiene. In this process the educator uses the child's own urges, is guided by aims that the child can appreciate. He tries to obtain an understanding of the real motives and causes of children's behavior.² He seeks to give direction to children's interests and enthusiasms rather than to repress them.

A systematic perusal of the articles and books relating to discipline, published from 1885 to 1937, gives the reader a panorama of specific practice, a history of the evolution of the philosophy of discipline, and accounts of a few attempts to study some phase of the problem scientifically. Reports of surveys and descriptions of practice are numerous; philosophical discussions of discipline, almost as numerous; and research specifically on the problem, relatively rare.³ A much closer connection appears to exist between practice and philosophy than between practice and the results of research. There were few references to objective studies in the schoolmen's published articles on discipline.

II. EARLY EMPHASIS ON OBEDIENCE TO AUTHORITY

When the older members of this generation were school children, they were subjected to severe discipline. Obedience to authority was the rule.

Whether he [the teacher] sits, stands, or walks in the presence of his school, he sways a sceptre which, though unseen, is constantly felt. The very atmosphere which surrounds him is pregnant with authority . . . The government of a school cannot be a democracy; it must be a monarchy, whose sole power to govern is vested in one man or woman whose authority is absolute. His will is law and that law must be obeyed.⁴

²I. S. Wile. *The Challenge of Childhood; Studies in Personality and Behavior*. (Thomas Seltzer: New York, 1925)

³P. E. Harris. *Changing Conceptions of School Discipline*. (Macmillan Co.: New York, 1927)

⁴H. Orcutt. *School Keeping; How to Do It*, pp. 60 and 70. (N. E. Publishing Co.: Boston, 1885)

There was apparently no recognition of the fact that the characteristics favorable to obedience are imitation, love of approbation, and plasticity—all 'negative' traits,—while the qualities antagonistic to obedience are persistence, curiosity, and initiative—all active, or 'positive' traits.⁵

Some writers accepted corporal punishment as inevitable and desirable, sanctioned, in fact, by divine authority. Others, while recognizing the moral, intellectual, and esthetic drawbacks of the discipline of physical force, seldom doubted its value in teaching pupils to work. With the exception of a few protests against the 'old education' with its 'sound thrashings and unsound psychology,' educators, at the beginning of the twentieth century, inferred an inevitable dichotomy between 'the newer type of discipline' and hard work; between interest and effort. Dewey's famous essay⁶ probably did more than any other one influence to convince educators that interest was the ally, not the enemy, of persistent effort. Still other writers, while not fundamentally changing their philosophy of education, sought to obtain obedience to authority through the 'personal magnetism' of the teachers, through various devices, and through a pseudo kind of student participation in government.

1. Corporal Punishment as a Means of Enforcing Obedience

The prevalence of corporal punishment prior to the twentieth century is evident from a number of surveys. In St. Louis' the number of cases of corporal punishment and of suspension per thousand pupils from 1881-82 to 1924-25 was as follows:

Year	Corporal Punishment	Sus- pension	Year	Corporal Punishment	Sus- pension
1881-1882	141.1	10.0	1906-1907	11.5	5.3
1886-1887	79.6	9.4	1911-1912	9.0	4.3
1891-1892	40.9	7.2	1916-1917	2.0	2.6
1896-1897	34.8	6.4	1921-1922	1.1	1.7
1901-1902	11.4	3.5	1924-1925	1.7	2.0

⁵ D. A. Thom. *Everyday Problems of the Everyday Child*. (D. Appleton-Century Co.: New York, 1927)

⁶ J. Dewey. *Interest and Effort in Education*. (Houghton Mifflin Co.: Boston, 1913)

⁷ H. H. Davis. "Corporal punishment and suspension." *School and Society*, 28: Nov. 17, 1928, 632.

If St. Louis is representative of other cities, control through corporal punishment and suspension was well on its way to becoming extinct by the end of 1925. It was employed only in exceptional cases, and its use was considered a sign of teacher incompetency and inefficient school organization.

Nevertheless, corporal punishment has not been prohibited by law⁸ because of the exceptional case. It was thought that there was now and then a child so stubborn, or depraved, or vicious that only fear of physical punishment would hold him in restraint. There were other children who had unfortunately become accustomed to brutal and inhuman treatment far below prevailing school standards of discipline. Most important of all, there are individual differences in children's reaction to discipline that make corporal punishment occasionally effective and justifiable. During the past year a psychiatrist connected with a leading university reported an exceptional case⁹ in which corporal punishment was used as an effective part of the program of habit revision.

2. Control by Means of the Teacher's Personality

In the first part of the twentieth century no fundamental change in the philosophy of discipline was made when control through the personality of the teacher was substituted for control through physical force. Discipline was still divorced from instruction; obedience to authority still took precedence over the emerging ideal of freedom with responsibility.

The emphasis on control through the teacher's personality was indicated by such comments as: "It is all a matter of personality" and "A glance of the eye is sufficient." To which one teacher humorously replied, "Well, perhaps it is, if you look like Catherine of Russia or Carrie Nation. Some of us do not."¹⁰

Control of this kind is as surely adult restraint as is threat of punishment. It is very different from the constructive personal relationship between pupil and teacher that is such an important factor in modern classroom management.

⁸ B. C. Holt. "Rules and regulations concerning corporal punishment." *American School Board Journal*, 77: 1928, 104.

⁹ B. Hohman. "Problem Child or Problem Habits." *What Science Offers the Emotionally Unstable Child*, pp. 16-30. (Proceedings of the Third Institute on the Exceptional Child under the Auspices of Child Research Clinic of the Woods School, Langhorne, Pa. The Woods School, 1936)

¹⁰ F. Warner. "New teacher and discipline." *Education*, 40: 1919, 177.

3. Control through Devices

Between 1900 and 1920 a 'sedative' view of discipline prevailed. The aim was so to shape affairs that distractive influences intruded themselves very slightly. Accordingly a good deal of emphasis was placed on the routine of the classroom, apparently with the idea of eliminating disorder by giving the pupils no opportunity to deviate from the prescribed path. The good teacher was confident of his ability to forestall disorder and to be one jump ahead of the pupils. During this period teachers wanted to know the 'tricks of the trade.' They sought prescriptions rather than methods of diagnosis; remedies rather than cures.

4. Control through Student Participation in Government

Student participation in government was at first merely a disciplinary appendage to the regular school régime. It was one of many attempts to establish a satisfactory control in the school without making any fundamental change in educational psychology and philosophy. Authority over certain matters was transferred from the teacher to the students. The pleasure that accrued to a few pupils from such delegation of authority was chiefly in keeping other persons 'in line' and in checking their misdemeanors. It developed dominative characteristics rather than habits of coöperation. Even today, it is only in rare instances that student governing officers consider their main task that of helping other students to get the most out of their school experiences.

Honor systems appear to fail in some situations and succeed in others. One reason why honor systems are so difficult to operate is because of the widespread dislike of 'telling on' another person. Both the adult world and the child world hates a tale bearer. Yet in order to maintain law and order it is necessary that the 'civil code' be substituted for the 'child code.' The honor system, as it has operated in the schools, is definitely bound up with the philosophy of obedience to authority.

III. THE COMPETITIVE IDEAL

It has long been recognized that industry can be stimulated by competition as well as compelled by force. The whole array of marks, rewards, and punishment is an essential part of the competitive system. In 1885 the attitude toward reward and punishment was expressed in the following words: "All favors bestowed must reward *only* fidelity and submission; none can be gained by disobedience. Still further, pri-

vation, inconvenience, or pain, as the case may be, must always attend or follow the act of transgression. This is according to the divine plan, after which family and school government should be modelled."¹¹ Even in present practice the competitive emphasis is still strong.

IV. CHILD DEVELOPMENT AS THE GOAL OF DISCIPLINE

Under a régime of obedience to authority a child lacks the opportunity to grow in self-direction and self-control. Under a competitive system habits of domination and rivalry rather than habits of coöperation are developed. In an environment that provides for child study and guidance, for freedom with responsibility and instruction, the best development of every child is possible. Children cannot be expected to make wise choices and decisions for themselves until they have had experience in doing so. In spite of the protests against freedom, misinterpreted as synonymous with irresponsibility and license, classroom management is approaching the goal of freedom with responsibility.

Scientific studies of several types have contributed to the realization of this goal; for example, (1) laboratory experimentation on the effect of reward and punishment on learning and of success and failure on level of aspiration, (2) studies of children's and parents' attitudes toward punishment, (3) classroom experiments and demonstrations, and (4) clinical studies of disciplinary cases. Although there is little direct evidence in the literature that these investigations have affected practice, they have without doubt exerted an influence on psychological and educational theory that in turn has influenced the classroom procedures of teachers who have studied in normal schools, colleges, and universities.

1. Laboratory Experiments

Most of the directly relevant laboratory experimentation has been concerned with the effect of satisfaction and annoyance on performance. The relative effectiveness of reward and punishment in general has been established by both experiential and experimental evidence. A search through 1,068 biographies¹² resulted in 191 reported instances of a reward or a punishment. In 88 of these accounts some testimony as to its effect was given. The testimony showed reward to be almost universally beneficial, whereas punishment did harm twice as often as it did good.

¹¹ H. Orcutt. *Op. cit.*, p. 86.

¹² E. L. Thorndike, et al. *Psychology of Wants, Interests, and Attitudes*, p. 140. (D. Appleton-Century Company: New York, 1935)

Thorndike¹³ and his students, in an extensive series of laboratory experiments, came to the conclusion that the facilitating effect on learning of satisfying consequences was more universal, inevitable, and direct than the inhibiting effect of punishment of varying kinds and degrees of annoyingness. Punishment often seemed to do more harm than good because it shifted the response in an undesirable direction. Under laboratory conditions learning is markedly increased when the reward is supplemented by specific and usable information.

Gestalt psychology, with its emphasis on the total situation in which the child is enmeshed,¹⁴ makes clear that punishment may change the child's world by modifying his relationship with adults and by transforming his system of values. When the child's behavior appears 'good' to him and 'bad' to the adult, the punishment seems to the child to be exceedingly unjust. According to Lewin both reward and punishment create a situation of conflict and increase tension. They both cause the child to orient himself toward the reward or punishment rather than toward the task. Even the child's acceptance of the punishment does not lead to freedom, for he is further restrained by fear or threats of future punishment. In order to understand the effect of punishment or reward, it is necessary to study the situation as a whole and to recognize the forces that are operating in the child's field. The investigations of Hoppe, Frank, Jucknat, Fajans, and Rosenfeld, briefly reviewed by Lewin,¹⁵ indicate that success and failure are relative to the individual's goal or level of aspiration. If the task is far beyond the individual's power to accomplish, he has no sense of failure; if it is far too easy for him, he has no sense of success. Individuals differ widely in the relation between their level of aspiration and their level of performance. "The height of the level of aspiration in a given case is a resultant of the tendencies (1) to keep the level of aspiration as high as possible, (2) to avoid failure, and (3) to hold the level of aspiration in close agreement with a realistic estimate of future performance."¹⁶ Moreover, the success or failure in one field may either lower or raise the level of aspiration in another field. This type of investigation, although it has

¹³ E. L. Thorndike, et al. *The Fundamentals of Learning*, pp. 276-313. (Teachers College, Columbia University: New York, 1932)

¹⁴ K. Lewin. *A Dynamic Theory of Personality*, pp. 114-170. (McGraw-Hill Book Co.: New York, 1935)

¹⁵ *Ibid.*, pp. 250-254.

¹⁶ *Ibid.*, p. 252.

not yet permeated educational practice, is closely related to the problem of discipline.

2. Studies of Children's Attitudes

It is an important step toward maturity when a child discovers that the law resides in the situation, not in some person who is in authority. Discussions of rules and regulations published prior to 1925 show slight appreciation of the pupils' participation in making and enforcing school rules. Yet Piaget¹⁷ found, in the group of children whom he studied, a change with age in point of view regarding rules, cheating, punishment, fairness, and unfairness. Up to seven or eight years, children from under-privileged homes obey rules and regard them as unchangeable because they are imposed from the outside by an omnipotent adult. Cheating is considered wrong because an adult says it is. Punishment is something arbitrary and inevitable, likewise imposed by an adult. This is essentially a childish and immature point of view, which gives way, at about eleven years of age, to an autonomous system built up through the coöperation of the children with one another. Rules are then obeyed because they belong to the participants and exist for their benefit. With well-to-do children the "ethics of mutual respect" appears to be developed at a younger age than is the case with under-privileged children studied in Geneva and in London.¹⁸ Despite the publication of such results, in many schools, and even in institutions of higher learning, students still have but a small share in the making of rules.

This lag in school practice may be a reflection of home attitudes, for questionnaires have indicated that parents are distinctly conservative in their attitudes toward children. "They approve of child behavior which makes for smooth running of the household . . . but they show little regard for the wholesome personality development of the child . . . They endorse strict control, while psychologists stress freedom from compulsion."¹⁹

¹⁷ Jean Piaget. *Moral Judgment of the Child*. (Harcourt, Brace and Co.: New York, 1932)

¹⁸ M. R. Harrower. "Social status and the moral development of the child." *British Journal of Educational Psychology*, 4: 1934, 75-95.

¹⁹ Ralph M. Stogdill. "Experiments in the measurement of attitudes toward children: 1899-1935." *Child Development*, 7: 1936, 35.

3. Classroom Experiments and Demonstrations

A few attempts have been made to test in classroom situations the hypothesis regarding the efficacy of reward and punishment. The nature and results of several of these investigations will be briefly indicated. Briggs²⁰ commended one group of junior-high-school students and reproved another group for poor performance, with the result that 87 percent of the pupils made better scores after praise and encouragement than after reprimands and threats of punishment. Hurlock²¹ investigated the same problem with 408 boys and girls in the third, fifth, and eighth grades. After they had taken the National and the Otis Intelligence Tests, one group was told they had done excellent work and were urged to improve their scores. The other group, comparable in initial intelligence quotient and chronological age, were reproved for their poor work and doubt was expressed as to whether they would do any better on the next test. The groups that were either praised or blamed increased their scores significantly by about the same amount, while the group that was neither commended nor reproved made practically no improvement. Other investigators have likewise found that some motivation is more effective than none at all, but they report conflicting results as to the relative effectiveness of praise and blame. Different results would naturally be expected with different groups of children of different ages and levels of ability and from individuals who have previously been accustomed to different methods of discipline. There is need for experimental work in school situations on the effect of genuinely deserved praise and reproof on individual children who recognize it as such in the light of their goals and effort.

Classroom evidence that the 'newer' discipline works is convincing. Williams,²² for example, has presented evidence to show that a small group of boys, considered to be the "worst problems" by their principals, made marked improvement as the result of informal, self-directed activity. Holmes²³ described a Montessori School in which the children were free to occupy themselves as they pleased; there was no formal

²⁰ Thomas H. Briggs. "Praise and censure as incentives." *School and Society*, 26: 1927, 596-598.

²¹ Elizabeth B. Hurlock. "The value of praise and reproof as incentives for children." *Archives of Psychology*, 11: 1924-1925, 1-78.

²² Herbert D. Williams. "An experiment in self-directed education." *School and Society*, 31: May, 1930, 715-719.

²³ E. Holmes. "Discipline and freedom." *Nineteenth Century*, 80: 1916, 88-100.

order, yet there was absolutely no disorder. Rennie²⁴ presented similar evidence that, in a school situation that fosters true growth and development by giving freedom with responsibility and gradually substitutes control from within the child himself for rules imposed from without, the problem of discipline, in the traditional sense, vanishes. The responses of children to the social pressure that a communal life imposes upon them are evidence of the effectiveness of social control.

4. Clinical Studies of Discipline Cases

To teachers the most convincing evidence of the need of a thorough study of the situation and of the superiority of positive suggestion and encouragement over negative commands and discouraging comments is found in case studies of discipline. An excellent study of clinical material with reference to the philosophy of discipline was made by Sears.²⁵ From an analysis of twelve detailed case histories, Sears became convinced of the importance of examining objectively the physical and social factors in the environment that might be responsible for the child's behavior, and also of the necessity of removing, so far as possible, those obstacles to his best development. He concluded that if punishment were to be administered, it should be in the hands of a person who had won the love and respect of the child and who knew him best. Clinical studies have emphasized the fact that, while punishment may check a particular fault, it may, at the same time, incur still more serious consequences, such as associating dissatisfaction with something the child should like, arousing fears, and offending his sense of justice. An increasing number of teachers consider a 'bad case' as an opportunity to help an individual correct some personality defect that will interfere with his own happiness and his contribution to society. They discover his reasons for misbehavior, encourage him to find a solution of the problem, and help him to change the conditions that are contributing to his maladjustment.

V. CONCLUDING STATEMENTS

The researches relating to child development and social psychology, including laboratory experiments, studies of attitudes, classroom experiments and demonstrations, and clinical studies, have, without doubt,

²⁴ B. Rennie. "Discipline and the Dalton Plan." *New Era*, 10: 1929, 189-190.

²⁵ L. Sears. *Responsibility; Its Development Through Punishment and Reward*. (Columbia University Press: New York, 1932)

supplied a more scientific basis for the mental hygiene movement and the personal point of view, which, in turn, have influenced practice in regard to discipline.

The older idea of discipline was to keep the child from doing something that the teacher considered wrong. The idea of discipline as guidance is to provide favorable conditions for the child's best development and to help him to meet new situations in the most effective ways.

The older view of discipline regarded the teacher's personality as a means of suppressing 'bad' behavior. The modern conception of discipline recognizes a congenial pupil-teacher relationship as a necessary prerequisite to guiding pupils' activities.

The older idea of discipline emphasized obedience to authority at any price—corporal punishment, if necessary; teacher prestige and devices of classroom management, if possible. The modern concept of discipline gives scant attention to obedience *per se*; it is chiefly concerned with obedience as a means to good development and with progressive control by which the child learns to meet new, as well as old, social situations.

The kind of discipline varies at different ages, but it cannot be discarded at any period of life. Not only is the kind of discipline appropriate for the preschool child different from that appropriate for the adolescent, but it differs also with each individual. There is no one best method.

The complexity of discipline has become more fully recognized. Fifty years ago discipline was thought of as a simple process of 'making the punishment fit the crime.' The violation of rigid and specific rules was met by the automatic application of equally rigid and specific punishment. That concept is a far cry from the interpretation of children's behavior in terms of the situation that evoked it, the developmental history that leads to it, and the meaning of the behavior to the child. It is equally far removed from the present tendency to direct attention to the present rather than the past and to change, so far as possible, the factors that are now influencing future results.

Practice still lags behind theory. Observation in 1935 in eighty-three elementary schools showed a preponderance of discipline problems relating to violation of classroom order, disobedience of rules or commands, and other types of aggressive behavior. In the treatment of these problems physical force was used in less than one percent of the cases, censure in about half, and deprivation in about one fifth. Reward

through social approval or privilege and explanation or assistance in meeting the situation were used in fifteen percent of the cases. These teachers applied direct methods, such as punishment, rather than indirect methods, such as changing the organization of the classroom.²⁶

A questionnaire study of 312 high schools²⁷ likewise showed a tendency for educators to magnify offenses against school regulations and the moral code and to ignore those that denote a lack of personal and social adjustment. The chief disciplinary measures employed were detention after school, conferences with parents, and "sending the pupil to the office."

Actual practice, as reported by observation and questionnaire, is still far removed from the ideals of freedom with responsibility and progressive growth in self-control and self-direction. Far too little attention is given to disciplining children through helping them to discover and succeed in tasks that seem to them important.

²⁶ N. M. Campbell. *The Elementary-School Teachers' Treatment of Classroom Behavior Problems*. (Teachers College, Columbia University: New York, 1935)

²⁷ E. H. Garinger. *Administration of Discipline in a High School*. (Teachers College, Columbia University, Contributions to Education, No. 686. New York, 1936)

CHAPTER XIX

CONTRIBUTIONS OF RESEARCH TO THE DEVELOPMENT OF GUIDANCE IN EDUCATION¹

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The common tendency of research workers to advocate the use of new procedures and devices is always in more or less direct conflict with the natural disposition of the regular employees of an institution to continue using their old procedures without much change or adaptation to new conditions or individuals. This conflict, which tends to develop between the conservative operatives and the research workers in practically every field, is nowhere more clearly illustrated than in the development of guidance and the adaptation of instruction to the special characteristics and needs of the individuals to be educated. Although research had demonstrated, even before the beginning of the twentieth century, that individuals differ widely in their physical and mental characteristics, few schools or teachers were attempting to do very much about these differences, except perhaps to discourage from remaining longer in school those pupils who were thought to be "incapable of acquiring a liberal education." While the first third of the present century has seen remarkable growth in the attempts of teachers to give intelligent diagnosis and guidance to individuals, research workers insist that educational treatment must be made still more individually appropriate, and that actual practices in the schools still lag far behind the accepted theories that have developed out of research.

The word 'guidance' can be found only rarely in nineteenth-century educational writings, for many of the basic concepts upon which guidance rests had not yet found their way into the consciousness of teach-

¹ The reader's attention is called to the fact that Part I of the current Yearbook is devoted entirely to a discussion of "Guidance in Educational Institutions."—*Editor.*

ers and supervisory officers in the schools. Pupils were to be taught trained, or disciplined, but that they were also to be guided was rarely suggested, except perhaps in connection with certain social situations and moral dangers that were seldom directly discussed in the school's classes. Guidance was not in any sense an accepted function of the school, nor was it concerned with those phases of life in which the school took a direct interest.

Beginning in this country during the first decade of the twentieth century, guidance has now developed from an early stage in which it was considered as only an occasional incident in the extra-curricular work of a few teachers into a stage in which it is generally recognized as a useful procedure in education. Research, in the judgment of many who have observed these changes closely, has led the way in this development and will probably continue to lead until guidance has become recognized as a necessary foundation for, and an essential process in, all education. These three stages in the development of guidance are worthy of fairly detailed consideration, even though it is impossible to assert that school practice has yet passed beyond the first stage in more than a few localities.

I. GUIDANCE AS AN OCCASIONAL INCIDENT IN EDUCATION

Under pioneer conditions in America the really important matters of practical living were learned by a youth through informal participation in the life of the home and community. Colleges and schools were first established in America to give special training to a selected few who were thoroughly interested and well qualified by nature to interpret religious, legal, medical, and literary documents. The chief purposes, curricula, and methods of the schools were developed and became well established during this early period when the great majority of the child population went to school for very short periods, if at all. As decade after decade passed without bringing any serious challenge to the limited educational program of the schools, traditions with regard to what constituted a liberal education gained great strength and dignity.

Various forces were at work, however, building up new conditions under which no amount of tradition and inertia could longer prevent important changes being forced upon the schools. Parents somehow cherished the belief that if their children went to school longer they would obtain better economic and social positions. The democratic theory of

government was obviously dependent for its practical success upon having a high degree of informed intelligence in the average citizen. State legislatures, looking upon education as a promising means of improving the life and institutions of the state, passed compulsory education laws and increased their appropriations for the maintenance of public schools. As the number of children attending school began to approach more and more closely the total number who were of school age, and as the average length of each child's stay in school grew longer and longer, it became obvious that the curricula and procedures developed for the vocational education of a selected few in pioneer days were not adequate for the varied needs of all types of young people in a complex modern world. Recognition of the obvious inadequacies of the school's services to many types of pupils reinforced in a practical way the findings of scores of research studies, which had been showing for years that individual pupils differ widely in their abilities, attitudes, and interests. Age-grade tabulations, achievement-test reports, and school surveys had all called attention rather sharply to the fact that some pupils were not accomplishing what was expected of them and would probably not benefit by being required to remain in school for longer periods of the same academic type of education.

The first general response to this obvious inadequacy of the school program was to provide more than one type of school program, retaining the one that had been established for those who were fully able to take the academic subjects successfully, and providing others for those who could not. While this provision of several alternate types of school programs helped the situation to a certain extent, it failed to meet it satisfactorily, for the children who could not do academic work successfully were far from being homogeneous groups. Some of those who failed in the academic program were, it must be admitted, able to succeed in the woodworking shop, but most of them did poorly there as well. Other programs were provided in home economics, in agriculture, and in business subjects, but still there was a considerable number of pupils who failed to 'make good' in any of the various programs offered by the schools. Research studies and school surveys, employing techniques of investigation developed by research workers, were largely responsible for pointing out the inadequacies of these alternative programs and were instrumental in bringing to the attention of school officers the needs of individual students for still further diagnosis, guidance, and instruction.

This first stage in the recognition of individual guidance by the schools tended to look upon guidance as something to be tried after everything else had failed. The youth was to be 'educated,' if possible; but, if he could not learn the approved subjects, he was to be given vocational guidance and launched upon a productive life. Ideas regarding the actual processes and techniques of guidance were not very clear, but it seemed evident that specialized skill and knowledge would be needed by one who was to give guidance, and this gave rise to the notion that the school would need to employ a vocational guidance expert to render this service. What particular tools the guidance specialist would be able to use was certainly not made clear, although it seemed obvious that he should know a great deal about occupations and that he should supply the youth with appropriate information about conditions and trends in occupations. The great emphasis in the school itself was still upon academic or cultural subjects of the traditional abstract type; but guidance, primarily vocational guidance, was finally admitted as a possible service that the school might attempt to provide in those cases in which the youth seemed unable to master the accepted school subjects.

It was not uncommon, at this stage of guidance development, for a superintendent of schools to hear that some other school had 'set up a guidance department' and to decide promptly to do likewise. When he tried to employ an expert, however, he found that none was available; so he either gave up the idea or appointed some member of his own teaching staff 'to do guidance work.' Such a teacher usually 'inquired around' to find what she might do, and she usually read a few books or magazine articles on the subject. If she had enjoyed her previous teaching experience, she usually set up a vocational-guidance course for high-school students. Such courses were commonly composed of readings and lectures giving organized information about professions or industries and the jobs in them. In addition to teaching such classes, the vocational-guidance teacher usually arranged for certain office hours during which she might be consulted by any students who believed that they needed help. The other teachers in the school usually welcomed this addition to the school's machinery, for it was easier to tell a pupil to consult the vocational-guidance department than to admit to him that the subject in which he was making no progress was really not an appropriate subject for him to study. The more non-academic types of students usually approved of the guidance office,

because they found there someone who seemed, at least, to have some concern about real jobs in the non-school world.

A few of the distinguishing characteristics of this initial stage in the development of guidance were that: (1) it was thought of as something to be given to those pupils who could not carry regular school work successfully; (2) it was concerned almost exclusively with vocational life after leaving school; (3) it was to be administered by a special office concerned with vocational guidance only; (4) it was to occur once, at about the time the pupil was ready to leave school; (5) it was to consist chiefly of advice about what particular job one should enter and of organized information about occupations; and (6) it raised no serious questions about the curricula, methods, or organization of the school itself. It may easily be recognized that most of our schools have not yet gone much beyond this initial stage in the development of guidance, so far as their actual practices are concerned, although some of them do accept in principle the philosophical ideas characteristic of the next stage about to be described.

II. GUIDANCE AS A USEFUL PROCEDURE IN EDUCATION

Most persons, including those engaged in education, have a tendency in actual practice to accept the statement of someone who knows or claims to know the answer to a problem rather than to investigate or to think out for themselves an effective solution. The general notion that vocational guidance is needed by many pupils has been rather readily accepted, therefore, even though many of the strongest statements to that effect have come from research workers whose published studies have been more directly concerned with other matters. Intelligent attempts to solve important instructional problems in any field seem to have an inevitable tendency to indicate a need for individual diagnosis and guidance. One cannot answer with confidence any question regarding the instruction a youth should have until one knows the characteristics of the youth himself and the nature of the life he will probably have to live. Those who accepted the doctrine of guidance merely because research workers had recommended it were not always conscious of much that it involved. They were frequently ready to believe almost anything about the techniques available for making diagnoses and for giving guidance. Many of those who joined the vocation-guidance movement seemed to believe, for example, in a sort of magic by which pupils who were required to read or to listen to hun-

dreds of words about occupations each day for a year would somehow through that academic process discover exactly what they were best able to do in life.

As popular and professional interest in the possibilities of vocational guidance grew, however, research workers turned more direct attention to it and began to analyze and to test the processes needed for making it really effective. Dr. T. L. Kelley, for example, in his study entitled *Educational Guidance*, pointed out in 1914 that if tests were ever to be effective in predicting vocational success they ought to be even more effective in predicting success in school. A large number of studies appeared during and immediately after the World War, many of them extremely well planned and conducted, to determine just what measures or groups of measures could be used at various stages in a child's development to predict his subsequent success in the different types of educational programs. It was primarily these intensive studies of the predictive values of test scores and other personal data, together with extensive case-study reports from child-welfare stations and visiting teachers, that led to a second stage in our understanding of the place of guidance in the educational process.

As long as achievement in a course was measured and recorded solely in terms of some grade assigned by the teacher, little could ever be known by anyone else regarding the real nature of the student's abilities or progress, and little could be learned regarding the relative merits of different procedures, teaching materials, classroom conditions, and the like. The highest grade possible would under one teacher be assigned for an accomplishment that was far less than the lowest accomplishment made under another equally well-trained teacher of the same subject, at the same grade level, and working with equally competent pupils. The assignment of marks by teachers furnished definite letters or numerals that seemed to have significance, but that were really so unreliable and variable in their actual meanings that valid interpretation of an individual pupil's characteristics by supervisors or research workers was absolutely prevented. A grade of 'Good,' '90%,' or 'B,' depending upon the teacher and the circumstances, might refer to a student's native intelligence, his character, his effort, his final knowledge of the subject, his progress during the term, his attendance, or any combination of these and a hundred other characteristics.

Research studies revealed the lack of valid meanings in teacher's marks and pointed to the necessity of using objective records of spe-

cific behavior patterns as the only sound bases for determining the characteristics of an individual or of any group of individuals. It then became clear from scientific examination of objective records that recognizing the presence in many individuals of equal amounts of any given trait, sixth-grade ability to identify English words, for example, has relatively much less value for the diagnosis and guidance of these individuals than discovering exactly how much of each of many other traits may be present with this one. In other words, sixth-grade ability in vocabulary, when combined with age twenty-years, weight two hundred pounds, artistic judgment zero, and intelligence quotient eighty, means something very different regarding the student than does sixth-grade ability in vocabulary combined with age eleven years, weight one hundred ten pounds, high artistic judgment, and intelligence quotient one hundred fifteen. The understanding that when two or more traits appear in the same individual they usually reinforce or modify each other, and that a child's personality is not merely the arithmetical sum of his various independently measured traits has been very slow to develop and will probably be put into practical use by teachers even more slowly. Such understandings have developed from research, however, and are basic to the effective diagnosis and guidance of individuals. Even for the second stage in the development of guidance, it is necessary to have at least a superficial glimpse of the implications of these understandings, but in order to enter the third stage it will be necessary to have a thoroughly dynamic understanding of such principles and a full acquaintance with many as-yet-undiscovered facts about the specific combinations of characteristics that enable one to succeed in different fields of activity.

The second stage in the development of guidance may be distinguished from the first by the following characteristics: (1) it was more clearly recognized that guidance would be helpful to many pupils in the regular classes, as well as to the few who were having unusual difficulty in keeping up with their fellows; (2) guidance was now seen to have educational, as well as vocational, value and importance; (3) it had become clearer that regular teachers and supervisors must coöperate closely with guidance specialists if satisfactory results were to be achieved; (4) it was now evident that practically every pupil who needed guidance would have to be given such help at various periods during his school career, rather than only once near the end of it; (5) it was becoming obvious that guidance would have to be based upon a

much more complete study of the individual than had at first been thought necessary, and that the mere supplying of printed or oral information about jobs was far from being an effective method of providing young people with needed understandings of occupational requirements; and (6) there were now numerous evidences that for many pupils an insistence upon the standard curricula, methods, and organization of the school's regular program would practically destroy the important benefits that might be obtained from intelligent diagnosis and guidance. In brief, guidance in its second stage of development had begun to be recognized as a really important procedure in educational programs.

It cannot be truthfully said, of course, that guidance has yet fully developed into this second stage. Most of the better teachers colleges and schools of education are now giving courses in guidance that conceive of it on this second level, but most of the public-school systems either have no guidance program at all or have a very limited program that in its conception is little, if any, beyond what has been described as the first stage—that of an occasional extra-curricular incident in the activities of a few teachers. Research and educational thinking have gone steadily forward, however, and guidance is undoubtedly destined to be carried by them to a still more significant stage or position in education.

III. GUIDANCE AS A NECESSARY FOUNDATION FOR, AND PROCESS OF, EDUCATION

As the number of schools trying to provide educational and vocational guidance has increased, research workers have been able to carry on an increasing number of direct studies of its effectiveness and organization. A closely related factor in the situation has been the development by psychologists of greatly improved instruments for measuring specific human abilities, aptitudes, interests, and attitudes. The early work by such psychologists as Cattell laid a splendid foundation in the measurement of specific sensitivities and neuro-physical responses, but relatively little practical use was made of the method and results at the time. The work of psychologists in the United States Army, followed by further research such as that done under W. D. Scott and his group at Pittsburgh, gave added impetus to the development and application of more useful measuring instruments. The refinement of statistical methods by such men as Thurstone and Kelley

resulted in greatly improved analyses and measurements of more specific factors in human abilities and reactions, by means of which a much more complete understanding of an individual is now possible.

Simultaneously, there have been more and better reports on individual cases studied by clinical psychologists, psychiatrists, psychiatric social workers, visiting teachers, experts in the diagnosis of reading difficulties, and the like. Greater and greater numbers of teachers have been experimenting at the same time with classroom programs in which the individual pupils work together in small groups for the accomplishment of purposes that really interest and challenge them, while the teacher observes, takes notes, questions, gives praise and encouragement where it will be useful, and guides or assists the pupils who invite or need her help. The emphasis in these classes has been on the development of an integrated personality, well adjusted to current demands in the social group, rather than upon the memorization of a predetermined list of facts or the mastery of a uniform series of academic skills.

One of the most important factors to create confidence that the third phase in the development of guidance will ultimately be reached is found in the implications of research work that has been carried on during the past two or three decades with regard to the learning process, discussed more fully in another chapter of this Yearbook. The Gestalt school of psychologists has made it clear that the situation to which a person responds may be very simple or very complex, and that the reaction made to any given situation may also be either simple or complex. Thorndike and his research assistants have pointed out that "if a situation is identifiable and a response is available" the teacher needs only to arrange matters so that the pupil (1) will make the appropriate response when the situation is presented and (2) will then feel a sense of achievement or satisfaction when the response is made.² The feeling of satisfaction is apparently the key to effective learning, for little, if any, learning appears to be produced by mere exercise without satisfaction.

Study of the implications of these findings clarifies the task of the teacher, but reveals it in a very different light from that in which it has commonly been viewed. The most important change suggested is that the teacher, in order to promote effective learning, must know the

²E. L. Thorndike. *Fundamentals of Learning*. P. 347. (Teachers College, Columbia University, 1932)

pupil much more thoroughly than has heretofore been thought necessary. First, the teacher must know whether the situation is identifiable by the pupil. If the child does not hear the question, does not understand the direction addressed to him, or does not recognize the situation, it is useless to expect him to make the right response. Second, the teacher must be certain that the desired response is already available in the child's nervous system. If a pupil cannot pronounce the desired word, feel the desired emotion, or make the desired movement of his lips or hands, it is futile to expect him to do so when the situation to which it is the appropriate response is presented to him. Third, the teacher must know just what the pupil's tensions, purposes, and interests are, in order that he may arrange the total situation in such a way that a correct response made by the child will reduce some tension, satisfy some curiosity, or accomplish some purpose, and thus cause the child to feel a certain amount of satisfaction when he makes the correct response to the situation. If a boy's real purpose is to make his fellows admire him for his impudence, there is small chance that he would get any great satisfaction from a teacher's praise when he has given the correct answer to a question. The pupil's interests and motives determine whether satisfaction will follow the making of the response the teacher desires to the situation presented, and hence whether that response to that situation will be any more likely to occur the next time. Unless the teacher knows the pupil's purposes, the pupil's abilities to respond, and the pupil's sensitivity to the situation, he cannot be sure that his efforts in the classroom will assist any learning to take place.

Just as individual diagnosis and understanding of the pupil form the basis on which effective instruction must be planned, so individual guidance is the essence of good instruction. What the pupil does and how he then feels about it determines whether he learns or not. What the teacher says or does in the classroom is of importance only to the extent that it affects what the pupil does and feels. The teacher, under any circumstances, must take about the same relation to the pupil that a modern physician takes to his patient. Instead of spending long hours in mystic incantations, as the primitive medicine man did, the modern physician or teacher spends most of his time making sure of his diagnosis. The pupil or patient is, however, the one who finally takes the exercise, diet, medicine, or other treatment prescribed, and he takes it in order to accomplish a definite result that is sincerely desired. When

a student is working to accomplish a purpose that is really important to him, a teacher can successfully encourage him, tell him where to get helpful information or materials, and otherwise guide him in his activities, even though it would not be educative for the teacher to do the actual work for the student.

It appears, therefore, that the third stage in the development of individual diagnosis and guidance in education places these functions at the very heart and center of the educational process. Diagnosis of the individual and a thorough understanding of the community life into which he is to be adjusted must be available to supply a sound foundation for effective teaching, and teaching itself must consist largely of giving the student encouragement and guidance. This stage in guidance has, of course, not been fully achieved even in educational theory, and far less completely in educational practice. In a democratic state, however, the trend of educational theory and practice must be increasingly in the direction of making individual diagnosis the foundation for instruction and making individual guidance the central activity of the teacher. If extensive and socially expensive programs of remedial teaching in reading, language, arithmetic, character, personality, vocational training, and the like, are to be avoided, individual diagnosis and guidance must become the everyday program of the schools for every pupil from the nursery school through the university.

It seems probable that, when this third stage in the development of guidance has actually arrived, it will be distinguished from the two earlier stages in a number of ways: (1) Guidance will be recognized as needed by every pupil rather than by a selected few only. (2) It will then be obvious that intelligent guidance is also necessary in social, economic, physical, spiritual, educational, and all other fields, even though guidance in the vocational field will always remain a vitally important need for practically all individuals. (3) It will probably be recognized that all teachers and school officers must be active and integral parts of the school's comprehensive program of individual diagnosis and guidance. While there will undoubtedly be a certain amount of specialization of functions, placing direct responsibilities for statistical calculations on one group, for routine clerical duties on another, for aptitude testing on another, and for organizing vocational information on another, every member of the school's staff will be conscious of the vital need for objective facts about individual students, for data about the demands of the community for each different type of service,

and for more effective ways of acquainting individual students with the data they need to use in making intelligent decisions. (4) Guidance will then be understood as a continuous process of promoting socially desirable growth, rather than as an event that occurs only once or twice in a pupil's life. (5) Guidance will be recognized as demanding the fullest possible information about the individual and the constant employment in every field of those instructional methods that have been demonstrated by research to be most effective. (6) Uniformity in educational programs will be permitted only in so far as the most careful diagnoses of individual pupils reveal that they have identical capacities, interests, backgrounds, opportunities, and needs.

It should be pointed out that guidance in this third stage will be recognized clearly as a means for preventing maladjustments and wasted time rather than as a means for correcting efforts that should never have been made. Remedial work must often be done now because proper diagnosis and guidance were not available earlier, but a continuous diagnosis and guidance service should make later remedial work unnecessary. Such a continuous guidance program would at any particular moment, of course, be tentative and incomplete rather than final and conclusive. The effort at all times should be to develop in each student as much skill in self-analysis and self-guidance as possible, so that, when he has left the school entirely, he may carry on effectively for himself the constant adjustments and readjustments required in modern life. By helping individuals to avoid wasting time at inappropriate tasks, diagnosis and guidance should have the effect of expanding and enriching one's opportunities in life rather than of restricting or limiting them. Guidance helps the individual to "know the truth" about himself and about the demands of everyday life, and knowing the truth makes him "free."

The tendency to think of guidance as concerned with vocational problems only has caused some academic persons to oppose it on the ground that it must be an enemy of real culture. Individual diagnosis and guidance are concerned, however, with all education rather than with any limited phase or type of instruction. No teacher can approach full effectiveness in his teaching without knowing and guiding each student in terms of his peculiar needs, whether the instruction be in the field of spelling, arithmetic, ancient history, music, or personality. Furthermore, Dr. John Dewey in his chapter in the last section of this volume shows that there is really no important difference or conflict

between vocational and cultural education. Instruction, whether it be looked upon as sacred or secular, vocational or cultural, should be planned and carried forward in terms of individual diagnoses of vital needs as bases for intelligent guidance of the student's activities.

This concept of instruction, contrary to the notions expressed by some educators, gives the teacher a greater rôle than he has held under older concepts. Considering individual diagnosis and guidance as the chief activities of the teacher makes him absolutely indispensable in instruction. Under the older concept of the teacher as a lecturer and an informer, there was always danger that the radio, motion picture, and textbook might displace him, but under the newer concept of the teacher as a personal diagnostician, friend, and guide there is little chance of his ever being displaced by technological developments. Incidental learning has never been found very effective, but learning under guidance is not incidental; it must always be planned learning—learning that has been planned by one who knows the learner thoroughly and who also knows the requirements of the life for which the learner's activities are to fit him.

Individual diagnosis does not make it necessary, as some have suggested, to have a separate class in each subject for each pupil. There are many similarities among the pupils in any school, but the amount of uniformity that has been practiced in most schools has far exceeded that which could be justified by actual similarities in the pupils. Almost every child likes to be noticed, to be given responsibility, and to be approved by his peers.³ These desires sometimes take antisocial means of expressing themselves, but they can usually be counted upon to motivate a considerable part of the youth's activities. Even these most frequently found desires cannot, however, be taken for granted. The effective teacher must know that any given motive is strong enough to move the pupil before he tries to use it with that pupil. If a sufficient number of pupils actually need, and are individually ready for, a certain piece of instruction at the same moment, there is no reason why they should not receive it at the same time. The school should assume the responsibility, however, for discovering exactly what the abilities, interests, and limitations of each child are at any given stage in his development.

Perhaps it will be a long time before regular practices in the schools

³On this point the reader is referred to Dr. Mandel Sherman's discussion of Mental Hygiene in Chapter XXXV of this Yearbook.

actually reach this third stage in the development of diagnosis and guidance, for there are many factors that retard changes in institutional practice, even after the basic theories have been modified. People are always rather suspicious of those recommendations of research workers that are not in reasonable harmony with common practice. It must be admitted, also, that relatively little is yet known from objective measurements regarding the actual combinations or patterns of traits that contribute most to success in each of the chief types of vocational activities, social life, or leisure-time programs. Many of the tests and other data-gathering devices now available have discouragingly low reliability and validity. An enormous amount of basic research and constructive experimentation remains to be done. Furthermore, there are very few persons who are thoroughly qualified by nature, experience, and training to interpret soundly the available evidence regarding an individual's characteristics. Even if candidates for teacher training could be chosen from those who are best qualified by nature and experience for giving guidance and could then be provided with the best possible training for their work, it is doubtful whether the superiority of their instructional services to young people would soon be commonly recognized and rewarded, for there are certain deep-seated traditions that generations of subject-matter teachers have helped to develop and that it will take further generations of intelligent guidance to break down.

One of the most obstinate and destructive traditions, so far as the development of effective vocational guidance is concerned, is the almost universal habit of speaking of the professions as 'superior' callings and of manual-labor jobs as 'inferior.' College professors and other teachers should not be too sharply criticized, perhaps, for thinking that the kinds of interests and abilities they possess are 'better' than those possessed by sales persons or laborers. Students frequently acquire these undesirable attitudes from their teachers, however, and the consequences are often fatal to effective guidance. The professions and 'higher walks of life' are directly prepared for and are highly esteemed by teachers and college professors, while the various jobs that most public-school students must actually take are usually treated as less desirable and dignified. From the point of view of effective democracy, of course, one type of interest and ability deserves just as much honor as another if it is really useful in making community life more efficient. The individual who has discovered his own equipment of talents, and

who is employing them to the greatest possible advantage of the community, not only enjoys what he is doing, but he also deserves the highest honor from the community. On the other hand, an individual who is trying to hold a position for which he is not well qualified is not only maladjusted personally, but he is also deserving of disrespect by the community, whether he is a plumber, porter, physician, or preacher. One should only be judged 'inferior' or 'superior' in terms of the effectiveness with which he performs his own appropriate functions in the community.

Such obstacles to the development of guidance in education will be removed gradually, no doubt, through the conduct of more extensive research in guidance and the development of an educational staff that looks to science rather than to authority and tradition for its own guidance. The ultimate possibilities of guidance in education have scarcely been imagined, but the actual practice of guidance should develop slowly and soundly, with every forward step based upon careful investigation and intelligent planning, and with each technique and procedure subject to continuous revision in the light of new evidence.

CHAPTER XX

CONTRIBUTIONS OF RESEARCH TO HIGHER EDUCATION¹

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I. INTRODUCTION

The fact that a separate chapter on higher education appears in this Yearbook is itself an interesting commentary. Whether the topic be administration, training of teachers, curriculum, methods of instruction, guidance, or any one of the other topics singled out for special treatment in the earlier part of this Yearbook, it still appears that those reviewing the research that has contributed to various aspects of education have preferred to stop short of the literature in the field of higher education.

The fact that higher education is thus regarded as a separate field emphasizes the lack of complete continuity in the educational process. Students of higher education constitute a sort of separate cult. Nevertheless, the research studies in higher education will be found in the same fields and to a considerable extent concerned with the same problems as have been covered in considerably greater detail in other chapters of this volume. That will necessitate a very brief treatment as compared with the fuller treatment in the earlier chapters, and it will also mean unavoidably a certain amount of overlapping.

It is not assumed that changes that are made in college practice can be traced to any specific research studies. Research produces factual material that modifies the theoretical background in the minds of educators. As this background changes, gradual changes in practice

¹ The reader's attention is called to a useful compilation in this field, *Changes and Experiments in Liberal-Arts Education*, that appeared as the Thirty-First Yearbook, Part II, 1932, of this Society. In Chapter III of that yearbook, a tabular presentation lists 128 outstanding changes and experiments. There is also a selected bibliography of 145 titles.—*Editor*.

follow. Occasionally some specific research finding has such a definite bearing upon a particular educational practice that changes in that practice can be traced definitely to the results established by some research project. This, however, is rare.

It seems, therefore, that a summary of the results of research in higher education can best be made under certain categories of changes that are occurring in the field of higher education. These changes constitute trends. This procedure will center the attention upon the results of research in terms of educational changes rather than centering it upon particular research findings.

The trends discussed on the following pages, far from exhaustive in treatment, cover only selected areas where distinctive changes may be pointed out and where there seems to be fairly obvious relation between these changes and research studies that have been in progress during the past twenty years.

II. SCIENTIFIC METHOD IN HIGHER EDUCATION

Scientific method is first a point of view. How much shall an administrator rely upon facts? What machinery shall be set up to get those facts? The change during the last twenty years in point of view with respect to these two questions is the basis for much of the growth of research in the field of college and university education.

Less than fifty years ago in one of the leading state universities having at that time more than 2,000 students, the president's office had no secretarial help. The president opened his own mail, answered it in long-hand, kept no carbons, and put in the wastebasket after being answered all but a very few of the letters received. Today that university has a president's office with six full-time employees. The assistant to the president collects regular periodic information about teaching load, size of classes, research projects of the faculty members, and balances left in the important budget items. In addition, he collects, as occasion requires, information about a wide variety of other topics. Furthermore, other administrative officers, such as the registrar, bursar, librarian, and deans, are expected now to keep their records in such a way as to give detailed factual reports to the president at least once a year. The number of non-teaching employees is almost equal to the number of teaching employees. The administration has become fact-conscious. Mere personal impressions that derive mainly from the prevailing disposition of the officer in question are being ruled out.

This change is producing fertile ground for research in higher education. Without good records in the registrar's office, most studies in the field of admission to college or of student personnel are not possible. Without good records in the library, important studies of the utilization of books are not possible. While some research studies call for special experimental procedures (and these are usually of fundamental significance), the greater number of studies depend upon the compilation and interpretation of data collected for the purpose during the regular course of the institution's operation. Therefore, the sympathetic understanding on the part of both administrative and faculty members of the need for facts in higher education is the first requisite to the conduct of most research studies.

While such sympathetic understanding is yet far from universal, the progress made in that direction is the most distinguishing characteristic of higher education of the last twenty years.

III. OBJECTIVES OF INDIVIDUAL COLLEGE COURSES AND OF ENTIRE CURRICULA

Basic to improvement in instruction or in administration are the careful definition and refinement of objectives. Changes in the methods of arriving at objectives and in validating them, therefore, may well be the first field to describe.

Until very recently, college objectives, if stated at all, were usually in the most general terms. "Good character, the enrichment of life, and insight into the universe," or "training for efficiency in labor for one's self and for society, and for the enjoyment of leisure by one's self and in society," and comparable idealistic phrases summarized the objectives of liberal-arts colleges. When attempts were made to decide upon college procedures so as to achieve these objectives, it was found that these general phrases did not afford a very useful criterion, even though everyone admitted their validity.

The job-analysis technique common in industry seemed to offer a more useful approach. To classify and appraise the tasks that the graduate would later perform would suggest the intellectual equipment and the skills that the college might help to give him. Hence, starting with the easier curricula; namely, vocational or professional training, job analyses were made of such professional callings as pharmacy and teaching (Charters). These were followed by a sort of job analysis of the good life as neighbor, friend, father, and so forth (Peters). These

latter 'jobs' are seen to be those for which the liberal arts and sciences prepare. They constitute a list of specifications of "good character," "the enrichment of life," and similar general terms.

This movement has tended to reverse the emphasis. General terms that might be used to justify almost any subject matter and any method of teaching have yielded to specific terms. Many colleges have had the faculty members state the objectives of each course in terms of the specific changes the course is expected to bring about in the students. Against these specific terms, a college teacher can check the outcomes of his courses, and thus become critical of both the materials and the methods used in instruction. For example, when the objectives in medical-school anatomy courses were listed in terms of specific skills and knowledge required by the physician, it was then possible to check the long-standing claim that one cadaver was required for each two anatomy students. Experiments could be and were devised (Scammon and Jackson) to prove whether these precisely defined outcomes could be attained as effectively with three or four students to each cadaver. Not until it was possible to analyze the outcomes of curricula or of individual courses in specific, rather than in general, terms were such far-reaching research programs possible as the Modern Language Study, made under the auspices of the American Council on Education, or the National Survey of the Education of Teachers by the United States Office of Education. In all such research projects the first, and often the most difficult, task is the formulation of objectives in such specific terms as to constitute criteria for determining research procedures.

IV. THE STANDARDIZING AND ACCREDITING OF COLLEGES

Colleges are required in all the states to obtain charters before they may grant degrees. It might be assumed that before a state granted a charter conferring upon a college the authority to grant degrees, suitable standards would be fixed by the state to which the college would have to conform, but in many states, such is not the case; nothing is required beyond the mere general incorporation specifications, such as the number of incorporators and the assurance that the college is to be a non-profit-making institution.

It is obvious, therefore, that the states do not adequately standardize colleges by the process of chartering them. Colleges may be legally authorized to grant degrees, even though they may lack funds with which to carry on satisfactory work, or even though they may violate

every standard observed by high-grade institutions. Fortunately, few colleges take advantage of this privilege to run 'diploma mills.' Colleges in general set for themselves voluntarily and without reference to their lenient charters, standards as high as their funds will provide for. This, nevertheless, makes for wide variation among colleges with respect to the quality of their work. It encourages proprietary colleges that are maintained principally as income-producers for their owners or incorporators. It also encourages the establishment of colleges with insufficient funds to maintain a high quality of work, even where the incorporators are prompted by the highest of motives.

To solve these consequently very important problems of standardization and accrediting, many studies have been made during the past few decades. In general, the purpose of the studies has been to make a clear definition of what a standard college is.

Because low standards in medical schools were more obvious in their harmfulness and more easily detected than were low standards in some other types of institutions, it was natural that the attack on low standards should have occurred first among medical schools. The famous Flexner Report, made in 1910 to the Carnegie Foundation for the Advancement of Teaching, constituted so scathing a denunciation of a large number of medical schools that approximately half the schools then operating were driven from the field. This report was little more than a succession of critical observations made by Doctor Flexner as a result of his visit to one school after another. He had no clearly defined standards with which to measure the work in the schools. He was not himself a medical man. In fact, he was not a college teacher. Nevertheless, his report called to the attention of the educational world many obviously indefensible college practices and the tremendous harm that comes to society in general from the operation of medical colleges of low grade.

As important as was Doctor Flexner's report as a means of raising the standards of medical schools, it was even more important in its stimulation of the movement toward voluntary standardization. The Association of American Universities soon undertook the task of accrediting colleges of arts and sciences on the basis of their effectiveness in preparing students to do graduate work. In this effort the Association had the active coöperation of the Office of Education in the United States Department of the Interior. At about the same time regional accrediting associations, such as the North Central Association of Col-

leges and Secondary Schools, were organized. While the primary purpose of these associations was to accredit high schools in order that colleges might admit their graduates without entrance examinations, each association had a commission on higher education that set up standards for accrediting colleges. These requirements for accreditation became the most potent of all influences for raising college standards. Research in the field of standardization has in the main, therefore, dealt with the standards in force in one or more of these regional accrediting associations.

Each association stated its standards in such easily measurable terms as academic training of faculty members, number of books in the library, hours per week of teaching, endowment, etc. Each institution was able to check itself in terms of these quantitative requirements and in most cases to remove any deficiency. Accredited lists thus came to include the large majority of the colleges chartered to grant degrees.

About ten years ago general dissatisfaction began to be expressed with the assumptions underlying the standards of the regional associations. The quantitative criteria used were believed to fail to discriminate among institutions with respect to the more vital aspects of their work. Many studies revealed little correlation between the ratings of colleges in any single quantitative standard and any measure of academic achievement of students. A thoroughgoing study made in 1936 at the University of Minnesota clearly shows that in graduate work graduates of certain non-accredited colleges compare very well with graduates of accredited colleges (Edwards).

It became clear also that emphasis upon these quantitative standards tended to discount the more vital outcomes of college instruction. For example, the possession of the requisite endowment funds rather than an adequate faculty salary scale was often the goal of financial campaigns.

Because of these dissatisfactions, the North Central Association of Colleges and Secondary Schools undertook about six years ago to formulate standards for colleges on a different basis. Instead of all colleges being judged by common standards, each college is expected on this new basis to declare its own purposes and to be judged in terms of how well it accomplishes them. Variation in function among colleges is thus stimulated, but excellence in work is expected of all. Criteria for determining the effectiveness of its efforts in attaining its purposes have to be worked out for each college separately. That task is under-

stood to belong essentially to the college itself. The function of the standardizing agency becomes more that of counsellor than of judge, and thus its accrediting takes a less important place among its activities than formerly.

V. INDIVIDUALIZING INSTRUCTION

The trend toward individualized instruction is closely related to the movement to substitute qualitative for quantitative standards for institutions and to use for each college particular criteria selected for it in the light of its particular objectives. Instruction is becoming individualized in terms of the differing abilities and interests of the students. Both movements—substituting qualitative for quantitative standards and individualizing instruction—rest in part upon the same body of information; namely, the results of fairly objective tests. The two movements are, however, distinct from each other and prompted by quite different purposes.

Probably interest in adjusting instruction to the individual student came earlier and has progressed farther than interest in adjusting standards to individual colleges. The earlier testing of pupils in elementary and in high schools had an immediate carry-over into the college field. Adaptations of both the psychological tests and the achievement tests used in the lower schools were made for college students. High-school records on which appeared the marks earned in both psychological and achievement tests used in the lower schools were made for college students and began to accompany the high-school graduate to college. Deans and other student advisors began to make studies of what happened to college students having varying high-school records (Johnston). Out of these studies grew demands that requirements in college be adjusted to the varying abilities and interests of the students.

1. Forms of Individualization of Instruction

These adjustments took various forms. (1) Classes were sectioned on the basis of abilities of students (Seashore). (2) Non-credit courses were organized for those not prepared for regular courses. (3) Honors courses were organized for those who were thought capable of benefiting from greater freedom and more self-education. (4) Independent study plans developed that carried for chosen students all degrees of independence from the regulations governing students in general. (5)

Universities have established so-called 'university colleges' to provide a way whereby a student may cut across all established curricula and pick his course to suit his own purposes. (6) New kinds of colleges, such as the Los Angeles Junior College and the General College of the University of Minnesota, have been created to care for types of students for whom the already existing institutional organizations did not seem well adapted. (7) Finally and probably more important than any of these, college teachers are finding out about the abilities and interests possessed by the members of their classes and adjusting the instruction—the assignments and requirements—to the individual differences of their students.

The importance of this change in emphasis from the class to the individual cannot easily be over-emphasized. The center of teacher interest is thereby shifted from the subject being taught to the student trying to learn. A new criterion as to what is important in the subject matter is thus brought to bear upon all teaching. Also, a new relation is established between the teacher and his students. Each student is more likely to be enlisted in the earnest effort to educate himself. He is more likely to seek the aid of the teacher in that enterprise and less likely to try to bluff the teacher into believing that he understands when he really doesn't.

2. A Stimulus to Research Appraising Student Abilities

This movement has brought one other very significant change in the colleges. Careful analysis of individual student abilities and aptitudes calls for the use of techniques that are unfamiliar to the typical college teacher and too complicated for him to master readily. Therefore, to carry on this work of appraising student abilities and aptitudes has required the services of specially trained officers. These go by various titles, but the service they render is the student personnel service. Through this service not only are faculty members given the desired analysis of abilities that relate to the work of the teacher but students are also aided in an honest self-appraisal and are counselled with respect to a multitude of problems that until recent years have been regarded as outside the interest of the college.

The research studies that have played the major part in bringing about this fundamental change in point of view have been many. The three outstanding types may be best represented by the following:

a. *Psychological Tests*. An example of these tests is seen in those

developed by the American Council on Education. Especially useful for the purposes here under discussion has been the sophomore testing program carried out over several years by about two hundred colleges. These revealed the wide differences in native ability among college students as individuals and among students as groups attending different colleges. With the results of these tests available, it became not only educationally indefensible, but positively absurd also to treat all students alike or to measure all colleges by the same standards.

b. The Pennsylvania Study. This investigation was carried on by the Pennsylvania colleges with the coöperation of the Carnegie Foundation for the Advancement of Teaching. Achievement tests of a very general nature were given to the graduating classes of the Pennsylvania colleges. Extraordinary differences were found among college-student groups as well as among individual students. On the basis of the amount of general knowledge possessed, or of information supposed to have been acquired in college courses, there was found such wide divergence among the students that to judge them by common requirements would serve no useful purpose.

c. The Coöperative Test Service of the American Council on Education. By this service comparable forms of objective tests in several fields have been made available. Colleges have administered the tests under standard regulations and have submitted the papers or the results to the central office of the service at Columbia University. From these returns distribution tables have been drawn up and norms calculated. Here, again, amazingly wide differences have been revealed in the results achieved by different students from the study of supposedly common courses.

These nationwide testing programs, supplemented by literally hundreds of studies of narrower range, have established indisputably that differences of ability, aptitude, temperament, and previously acquired information and skill are so great among students that education must be individualized as far as possible.

VI. EXAMINATIONS

Twenty years ago college examinations were almost exclusively composed of questions of two types: fact questions and essay type questions. Studies had already begun to appear (Starch and Elliot) showing that teachers would vary greatly in the marks they would assign to any given examination paper. Even the same teacher would

often give very different marks on two readings of the same paper. The influence of the subjective factor in the case of many teachers was so great that little reliance could be placed on the quantitative evaluations of their examinations.

At about the same time, two movements were taking shape in the elementary school that were bound to influence college practices later. One was the scientific measurement movement (Pearson, Thorndike), which introduced to educators the educational measurement scale with an established zero point and a series of equal steps, or units. This made possible measuring amounts of achievement or of change in educational status. The other was the development of objective tests. These made possible comparisons of marks given by different teachers to the results of a common examination. They also established confidence on the part of both teachers and students in the reliability of the marks given.

These two movements began slowly to affect higher education. 'New-type' tests (Paterson) began to appear here and there in colleges, until during the last twenty years nearly all colleges have tried some form of the more objective tests in one or more departments. In many institutions such tests have come to be used regularly in all departments.

VII. PROGRAMS OF RESEARCH

Probably the outstanding result of the objective-test movement just described has been to emphasize the need for the more precise measurement of the outcomes of instruction. This has paralleled the movement to formulate objectives in more definite terms. These two movements, objective tests and more precise formulation of objectives, have both stimulated research programs and made possible effective work upon them. Of these research programs, four have been most fruitful and are deserving of special comment:

1. Comparisons of Methods of Instruction

Numerous experiments have been tried to test which of alternative methods of instruction is the better. Probably the most significant aspect of the growing use of the objective type of examination is that it encourages this sort of research. With such a device members of college faculties have developed research interests in methods of college teaching who would otherwise have confined their research interest to their departmental subjects.

Mention will be made only of the two questions studied most extensively:

1. Many studies have been made to show in what ways the lecture method, the discussion method, the seminar method, or a combination of these is best. These experiments have brought out clearly the fact that the superior method must be determined in the light of the maturity of students, their intellectual caliber, their previous study in the same field, the skill of the teacher, and many other variables. It is impossible, therefore, to say that any particular method is universally superior to any other particular method.

2. Many experiments have been carried on to test the effect of the size of the class (Hudelson). These have tended to show that as a means of imparting information such as is called for in the usual college examination, a large class may be superior to the small class. More recently, however, tests have been devised to measure the effectiveness of the large class in respect to outcomes other than factual. By these checks more doubt is thrown upon the seeming demonstration that the large class is as effective as the small class.

2. The Construction of More Satisfactory Objective Examinations

As a consequence of the criticism that new-type tests are too largely factual and, therefore, emphasize not personality development but encyclopedic learning, there have been two significant developments:

1. In order to assure that the test would cover all the expected outcomes of a given course, the complete set of the objectives of the course has been carefully drawn up before constructing the test. Such less concrete outcomes as 'growth in capacity to draw inferences,' and 'growth in effectiveness in self-direction' might, for example, be included in the objectives. The job of the test-constructor was then to devise a test that would measure these outcomes as well as the obvious outcomes in the form of information. Real progress has been made with this difficult undertaking (Tyler, Eurich). It has necessitated the close coöperation of the teacher of the subject and the specialist in the technique of test construction. Colleges may look forward confidently to test procedures that will measure all the important outcomes of instruction and at the same time be sufficiently objective as to make ratings comparable from teacher to teacher.

2. In recent years careful study has been given to ways of increas-

ing the objectivity of the essay type of examination (Freeman). Obviously, part of the reason for the wide variation in marks given to the essay by different graders is that neither the writer nor the reader has had many, if any, definite specifications or requirements to guide him in writing or in reading the essay. It has been established that with adequate directions before them, several graders will vary relatively little in the marks they assign to a given essay examination. No doubt one of the reasons why the essay type has been so very subjective is that teachers have found it such an easy type to prepare and to grade. When they are willing to devote time to the improvement of the essay type comparable to the time devoted to the construction of more objective tests, teachers will no doubt add greatly to the objectivity of the essay type.

3. Intercollege Comparison of Achievement

The third type of research studies growing out of the new-type test movement is the comparison of achievements of classes in different colleges studying the same courses. It has been a practice of long standing for friendly instructors in different institutions here and there to exchange examination papers. Not infrequently they have arranged to give common sets of examination questions to their respective classes. The value of this exchange was not very great, however, as long as the ratings varied widely. With the growing use of standard tests—particularly the comparable forms developed by the Coöperative Test Service—each instructor has been able to compare the achievement of his class with that of other classes. This has been a wholesome stimulant to self-criticism on the part of many college teachers.

4. Development of the Comprehensive Examination

One other development in the field of examinations should be noted. Just as new type tests have been devised so as to cover the whole gamut of objectives of a given course, so comprehensive examinations have been developed to test the integration that students have made of materials studied in many courses under many instructors. These examinations (Jones) have encouraged divisional organization, in which related college departments have been brought into more intimate groupings. They have facilitated the development of honor courses and other forms of independent study. They have also been useful in developing a more wholesome relation between student and instructor

because the student is conscious that the instructor is not to be responsible, at least not wholly, for the mark to be given on the comprehensive examination.

These comments serve to point out the interaction of the two procedures—instruction and examination. The extensive research in the construction and utilization of comprehensive examinations is important chiefly because it has made more easily possible experimentation with different types of college organization and instruction.

VIII. ADMISSION TO COLLEGE

Perhaps no other field of research in higher education has yielded such rich returns as studies of admissions to college. The reason is not difficult to see. High schools were maintained a few decades ago essentially as college preparatory schools. Not only were their teachers trained by the colleges and universities, but their curricula also were dictated from above. The states frequently appointed as high-school inspectors representatives of the state university.

After a time, other functions than preparation for college began to claim the attention of the high schools. These schools were to be the 'people's schools' to serve the educational interests of the communities that supported them. All kinds of courses were demanded by the patrons. The high schools rebelled against the domination of the colleges, insisting that they owed their first duty to the community.

But colleges have no other source of students save the high schools. The state universities almost by necessity, and many other colleges by choice, have come to admit nearly all high-school graduates without respect to college aptitude, although they have required a certain minimum of stipulated high-school subjects. Colleges suffer large losses of students, therefore, before graduation (McNeely). Colleges are unable to maintain as high a quality of work as they would like to. Students too often lack a vital interest in their college work.

Prompted by these unfortunate conditions, research workers have attacked the problem of college admissions in many ways, but notably in the following three:

1. Studies of the Bearing of High-School Courses upon Success in College

Studies have been made to try to discover what courses in high school make the best preparation for college. College entrance require-

ments are frequently stated in terms of specified units in English, in history, in foreign languages, and in sciences, plus optional units enough to bring the total to fifteen. The inference has been that the stipulated subjects constitute the best preparation for college.

The preponderance of evidence from these studies is to the effect that, except as college courses are built upon facts learned or skills acquired in a given high-school course, there is little relation between the courses taken in the high school and success in college. Early studies tended to show that students pursuing certain high-school subjects, such as mathematics, did better in college, but these studies mostly neglected the factor of native ability. Subsequent studies have proved that native ability tends to be higher among the students pursuing such subjects as mathematics than among those electing the so-called 'vocational' courses. It is this difference in native ability that seems to be responsible for the difference in college achievement rather than the effectiveness of mathematics as a college preparatory subject.

The quality of the work done in the high school rather than the subjects studied there appears to be the criterion of effective college preparation.

2. The Development of Tests of College Aptitude

The second fruitful series of studies of college admissions have centered in the development of college aptitude tests (Johnston). These are predominantly psychological tests with special adaptations to young people of college age, plus tests of those particular qualities called for in college study. These tests, combined with scholastic ranking in one's high-school class, have been found to be highly predictive of later college success.

Special forms of these tests have been developed in many states. State-wide testing programs of high-school seniors who expect to enter college, or who volunteer to take the tests anyway, are now carried out in about a dozen states. A double effect is being achieved. First, many students who have been planning to enter college are convinced by the evidence that they ought not to enter at all or that, if they do, they should enter a certain type of college for which they seem to have more aptitude. Thus, better college selection is made of those who had been planning to enter college. Second, and of even greater importance, many students who had not planned to enter college become aware that they stand high in college aptitude and decide to enter college. These often prove to be the best college students.

A special form of college aptitude test is that developed by individual colleges or universities (Chicago) to use as a college entrance examination.

3. Studies by the College Entrance Examination Board

The third series of studies of college admissions is that carried on by or in connection with the College Entrance Examination Board. The early practice of the Board was to examine the candidate in each high-school subject. Grouping of subjects and options among subjects were later adopted as variations of the earlier policy. During recent years a still more significant change in practice has been adopted. No longer is it regarded as adequate to test prospective college students on what they studied in the high school. Information comparable with what college aptitude tests reveal is now sought by the Board. Thus, psychological factors as well as mastery of subjects now play a part in the information that the Board supplies to the college concerning applicants for admission.

One other practice is becoming more and more common among the colleges that use the results of the Board's examinations in admitting students. The scholastic ranking of a student in his high-school class has been found to be such a reliable index of later college success that colleges are admitting students from the upper percentiles of the high-school graduating classes without reference to such other criteria as examinations. This practice has been brought about by the almost numberless studies revealing a high correlation between scholastic ranking in high school and scholastic ranking in college.

4. Experiment under Control of the Progressive Education Association

Finally, the most significant research study yet undertaken in the field of college admissions is that now going forward under the general control of the Progressive Education Association. About thirty high schools that maintain programs departing in one particular or another from the traditional college entrance requirements have secured the coöperation of more than one hundred colleges in the experiment. By the provisions of this coöperative arrangement, these colleges have agreed to accept graduates of the specified high schools with almost no regard to the traditional college entrance requirements, provided the principal of the high school concerned recommends the given high-school graduate as properly prepared to do college work.

In order to assure the validity of the findings of this experiment a special committee has been set up to devise suitable tests that will incorporate the more subtle values of both high-school and college work as well as the more obvious values tested by ordinary high-school and college examinations. By means of this experiment it is hoped that colleges will be provided with the criteria for setting up altogether different types of college entrance requirements, based not so much upon subjects studied as upon the growth in personality and intellectual power that takes place during the high-school years.

SECTION II

THE DEVELOPMENT OF METHODS AND TECHNIQUES
OF INQUIRY IN EDUCATION

CHAPTER XXI

THE CONTRIBUTION OF THIS SOCIETY TO THE SCIENTIFIC MOVEMENT IN EDUCATION WITH SPECIAL REFERENCE TO THE TRENDS IN PROBLEMS AND METHODS OF INQUIRY

GUY M. WHIPPLE
Secretary of the Society
and
Editor of the Yearbooks since 1916

I. PURPOSE OF THIS CHAPTER

In attempting to present in reasonably compact form the trends in problems and in methods of research exhibited in the contributions that this Society has made to education as a science, the exposition has been limited to the thirty-six yearbooks (67 volumes counting distinct treatments in parts) that have been published from 1902 to 1936. No attempt has been made to appraise the extent to which education as a science has been set forward by the discussions held at the annual meetings, or by the reading of the yearbooks themselves, or of the numerous quotations from them by writers of textbooks and committees in charge of courses of study, or by their use as textbooks in colleges, summer-school classes, normal schools, and similar agencies, although these influences upon the thinking and the practice of educational workers must be, in the aggregate, of very considerable moment.

II. CRITERIA FOR APPRAISAL AND CLASSIFICATION

In such a presentation, the writer finds himself obliged to set up for his own guidance some criteria for deciding what is 'scientific' and what is not. The criteria that have been employed would probably not pass muster when judged by a rigorous, academic definition; the reader, of course, may take issue with the writer and say: "I don't call that contribution 'scientific!'" So be it; no harm is done if the facts are set forth clearly.

The criteria that I have kept in mind include (1) inferences based upon facts as opposed to statements based upon general principles, however logical the deductions may be; (2) information derived by the use of standardized scales and quantified as opposed to opinion and appraisal not checked by measurement or statistical treatment; (3) material set forth in an intellectually detached, dispassionate manner, with caution to avoid prejudice or overstatement, as opposed to specious argument, special pleading, and rhetorical exaggeration; (4) stress upon analysis, especially in the effort to disentangle conditioning factors, as opposed to being content with the uncritical use of complex concepts and relationships; (5) carrying out extended and exhaustive experimentation with adequate controls and checks as opposed either to hazarding opinions unsupported by facts that might have been ascertained or to making conclusions on the basis of obviously incomplete observation or tentative experiments; (6) discovering facts or drawing inferences from data under conditions that permit checking for verifiability by other investigators.

These criteria will serve to indicate what I have in mind in this chapter as 'scientific.' It is obvious, first, that the several criteria overlap; and second, that they imply the existence of differing degrees of being scientific. Perhaps that is an illogical statement to make, but it is my opinion that contributions to education such as are found in our yearbooks exhibit varying approximations to an ideal (an ideal perhaps found in clear-cut, unmistakable form only in the physical sciences). Thus, when *A* asserts that in his opinion the use of the Method *X* in teaching Subject *M* is well-nigh universal, while *B* proceeds by the use of a questionnaire to gather information from 147 school systems, displays the results in tabular form, and shows that, in so far as his data go, Method *X* is used in 72 percent of public high schools but in only 36 percent of private schools; then *B* is, relatively speaking, scientific in his procedure, whereas *A* is not scientific.

There is another distinction to be made; namely, a yearbook may be deemed a contribution to education as a science either on the score of its subject matter or on the score of the method of approach used in the yearbook itself. For example, the volume on Intelligence Tests is primarily a contribution to the science of education because of its contents, its subject matter, whereas the volume on Methods of Measuring Teaching Efficiency is a contribution to a practical problem made by

following a clean-cut scientific method of approach. Naturally, some yearbooks illustrate both of these types of contribution.

III. CONCERN ABOUT THE 'SCIENTIFIC STUDY OF EDUCATION'

It is a curious anomaly that the word 'scientific' was included in our original name and later dropped. Chronologically, the Society is the successor of the National Herbart Society, whose five yearbooks, dated 1895 to 1899, inclusive, have not been included in this exposition. When the first yearbook of the present Society appeared in 1902, we were "The National Society for the Scientific Study of Education." Right here is an anomaly because the date (1910) when "Scientific" was dropped from our name coincides approximately with the beginning of what seems to me a more scientific manner of approach, as will be indicated in what follows.

Be that as it may, in those first years there was more or less persistent concern about this matter of being "scientific," what it really meant, whether teachers would understand or profit from the attempt, and so on.

Thus in the *First Yearbook*, we find a "Proposed Plan of Work," in which occur these statements (pp. 62-63):

The principles upon which education may safely be based are still more or less in dispute, and the foundations of education as a science are still open to serious study and discussion. . . . It is its [the executive committee's] business to see that there be submitted to the society each year strong scientific papers on one or more leading questions. The expression "strong scientific papers" should be given a more pronounced meaning. Each paper . . . should survey the whole subject completely from a strictly scientific point of view, commanding also its entire literature and such resources of experience as are necessary to a sound judgment.

Again, in 1905, the Secretary, M. J. Holmes, while discussing the place and function of the Society, asks (*Fourth Yearbook*, Part II, p. 67):

Can and will *teachers* sustain a society that is dominated by the exactions of scientific spirit and method? Time has not yet proved this in our country at least, but why should not this Society meet its opportunity and acquire such scientific character that the conferring of its membership will be more than a compliment—even an honor?

In the previous year, likewise, F. M. McMurry had suggested that "it would be a good plan to have a thorough-going discussion of what

is 'scientific method' in education." There was, accordingly, in the *Fourth Yearbook* a sort of brief symposium on this theme (Part II, 1905, pp. 72-76) presenting the views of some twenty members, including J. Stanley Brown, William H. Burnham, Lida Earhart, R. P. Halleck, John S. Keith, Frank McMurry, M. V. O'Shea, Stuart Rowe, David Eugene Smith, David Snedden, E. D. Starbuck, Joseph Taylor, and others, while in the next volume (*Fifth Yearbook*, Part I, 1906, pp. 81-82) there was a somewhat longer exposition of the views of E. L. Thorndike.

From Thorndike's exposition, three paragraphs may be quoted here:

The facts with which the student of education deals—changes in human beings and the causes thereof—have in many cases already been subjected to scientific treatment in the allied sciences of physiology, psychology, sociology, and economics. In the case of such facts, the student of education may consider himself and his work scientific when he and it are approved by the experts in these several sciences. If they do not know what is scientific in their respective fields, none does.

In many cases however, the problems of education are so specialized that their scientific warrant can come only from within. The rule then is that what the expert in the science of education deems scientific has the greatest probability of being so. The difficulty with the rule is that in education one cannot be sure of the expert. Consequently one must fall back upon the experience of science in general. . . . Power of correct prophecy is the test of scientific knowledge and . . . verifiability by any competent observer is its diagnostic symptom.

In the present condition of our science about all that can helpfully be said . . . is that he has the greatest probability of doing scientific work . . . who is by nature a scientific mind; who studies and practices the methods of the allied sciences with success; who heeds the obvious warnings of logic and scientific method in general; and who estimates all opinions about education in the light of their verifiability.

The views of the contributors to the 'symposium' were pretty diverse. Among the characteristics deemed features of the scientific study of education were intensive study, patient consideration, experiment, a sound basal philosophy and psychology, the widest possible appeal to fact, deduction of hypothesis and verification, applying a measured standard, a rational classification of educational phenomena, clear statement free from bias, any systematic careful study yielding verifi-

able conclusions, quantitative so far as possible, and numerous other similar characterizations.

IV. A CLASSIFICATION OF THE SOCIETY'S YEARBOOKS WITH RESPECT TO THEIR CONTRIBUTION TO A SCIENCE OF EDUCATION

The presentation in this section represents an effort to distinguish some score of types, or varieties, of approach or content, and to characterize, or label, these types by the use of descriptive categories. The ultra-critical reader will please keep in mind (1) that these categories are not supposed to be logically distinct, (2) that the listing of a yearbook under one of them means only that the predominant approach of the whole yearbook warrants placing it there, or that some portion of the yearbook illustrates the type, (3) that nearly every one of the yearbooks could be properly classed under several categories because it exhibits several types of approach, and (4) finally, that while the sequence of these categories is held to embody a progressive tendency toward being more scientific in approach, this is perfectly well understood to hold true only within very rough limits.

1. Personal Opinion about General Principles and Theory

With a few exceptions, no great violence would be done the facts if we say that during the first five years the Society's publications were expressions of personal opinion, and mainly of personal opinion about theory. Thus, Lucy Salmon (1, I, 1902)¹ told how she thought history should be taught; W. M. Davis (1, II, 1902), how geography should be taught; Dewey, Jackman, G. P. Brown, Henderson, and others how, in their opinion, this or that theoretical principle ought to be applied to education. These opinions were discussed with great fervor in the Society's meetings. We need to guard ourselves from the notion that these opinions and discussions are to be scorned because they were not buttressed with correlation tables, coefficients of reliability, or square yards of graphic distributions! Indeed, it may be noted that such discussions of general principles are not limited to these first yearbooks; on the contrary, similar modes of treatment will be found by Morrison (13, I, 1914), by Rugg and Judd (22, II, 1923), by Powers (31, I, 1932), and by many contributors to our latest yearbook (36, II, 1937) on "International Understanding."

¹ For brevity this designation is used in what follows. The citation here means *First Yearbook, Part I*, published in 1902.

2. General Principles and Fundamental Theory Arrived at by Discussion and Pooling of the Opinions of Several Persons

Our second category represents an extension and improvement over our first category because for a one-man exposition there is substituted, after extended discussion, a series of statements embodying the consensus of several minds, perhaps followed by a series of minority reports or statements by individuals making clear their divergencies from the combined report or the qualifications or emendations they would like to have seen added. An outstanding illustration of this category is found in the well-known yearbook on curriculum-making (26, I and II, 1927). In four or five earlier yearbooks, there are similar, though less striking, illustrations of this method of approach.

3. Authoritative Discussions of Concrete, Specific Issues by Experts

The yearbooks that are in mind in our third category differ from those of the first and second categories primarily in that the opinions expressed pertain, not to general principles and theories, but to concrete, specific issues. In most instances resort has obviously been had to this mode of approach because little, or no, experimentally derived evidence has been made available. Illustrations are to be found in "The Textbook in American Education" (30, II, 1931), "The Planning and Construction of School Buildings" (33, I, 1934), and particularly in "Music Education" (35, II, 1936). As a matter of fact, this resort to expert opinion is also found in rather lengthy portions of "The Teaching of Geography" (32, 1933) and of the "Second Report on Reading" (36, I, 1937), although there it is combined with other types of approach.

4. Provision for Critical Appraisal of the Content of Yearbooks by Experts Not Participating in Its Preparation

In some of the more recent volumes; for example, that on arithmetic (29, 1930), that on the teaching of science (31, I, 1932), and that on "The Grouping of Pupils" (35, I, 1936), there will be found either a special section devoted to a critique of the yearbook by 'outsiders' or chapters, interspersed among those by the committee that prepared the yearbook, written by 'outsiders' known to hold views at variance with those held by the yearbook committee. The intent is ob-

viously to render the volume as a whole more comprehensive, more representative of conflicting points of view, freer from any charge of conscious or unconscious loading or bias. Speaking from the point of view of twenty years of experience as editor of the Society's yearbooks, I find myself sympathetic toward this intent, but not convinced that we have been able by the methods thus far followed to accomplish the results desired.

5. Historical Summaries Tracing the Development of Movements or Practices, or Assembling the Work of Predecessors

In perhaps a fourth of the yearbooks more or less space is devoted to making clear the background of the yearbook in question, to sketching the history of a movement, to assembling earlier views. Without citing illustrations, it may be said that this inclusion of some form of historical survey or summary has been more frequent in the later yearbooks than it was in the first dozen or so. These summaries vary in merit; the best of them are of very considerable value and serve especially well to counteract the insidious tendency to exalt the new and the recent. It should be especially salutary to some of the present-day beginners in educational investigation to discover that a few at least of the brilliant new ideas with which they are overwhelmed have really been thought of before!

6. Analyses of Literature, Summaries of Experiments, Annotated Bibliographies

Closely allied to the preceding approach, but entailing a more direct, specific, and analytic summary of the situation, is a method of procedure illustrated in the yearbooks on "Gifted Children" (23, I, 1924), with its annotated bibliography of 453 titles; on "Individual Differences" (24, II, 1925), with its classified summary of the experiments to date; on "Extra-Curricular Activities" (25, II, 1926), with its analysis of the literature to date; and, of course, notably in the present volume, which is essentially a broad summary of the contributions made by the scientific movement in practically every field of education. Needless to comment on the value of analyses, summaries, and annotated bibliographies when they are well made; equally needless to comment upon the harm that may be done the trusting student of education who relies upon such sources of information when they are not well made.

7. The Description of Present Status or Current Practices

The descriptions of present status classified in this sixth category are those that for one reason or another are so limited in number and geographical distribution as to fall short of being truly representative. Perhaps for this very reason they include few attempts at analysis or intercomparisons and virtually no attempt to draw inferences or suggest recommendations. They are simply accounts of what the author could assemble by the methods and within the time available to him. In illustration may be cited Douglass' account of the junior high school (15, III, 1916), the volume on extra-curricular activities (25, II, 1926), the voluminous treatment of preschool and parental education (28, 1929), and the report of Brim's committee on "The Status of Rural Education" (30, I, 1931).

8. Survey of Present Status or Practices on a Comprehensive and Quantitative Scale

Our seventh category differs from our sixth partly in degree; more data are gathered and from a wider area. But it differs—it may be said without undue exaggeration—qualitatively, too. New machinery is employed—the questionnaire, tables of distribution, graphs, and the like. Furthermore, in the best illustrations, the data are used as a basis for comparisons and interpretations that greatly enhance their value. In other words, the survey of present practices is not an end in itself, but a preliminary step in a larger undertaking. Take, in illustration, the study of "Industrial Education" (11, I, 1912), which bears the subtitle "Typical Experiments Described and Interpreted," or such treatments as are embodied in "The Professional Preparation of High-School Teachers" (18, I, 1919), or "The Education of Gifted Children" (23, I, 1924), or "Changes and Experiments in Liberal Arts Education" (31, II, 1932), to cite a few of several treatments in which this type of approach is exemplified.

9. Analysis of School Reports, Courses of Study, and the Like

In a few yearbooks—that on aspects of high-school instruction and administration (13, I, 1914), that on the junior high school (15, III, 1916), and that on planning school buildings (33, I, 1934), for example—data are secured by a fairly intensive analysis of school documents, particularly of the reports of officers of administrations and of detailed courses of study. The method is too obvious to need further comment,

save perhaps to wonder why it does not appear oftener in our publications. Probably the approach is especially fitted for administrative studies, and there have not been many of these in our series.

10. General Principles Formulated on the Basis of Practical Experience

At first blush we may seem in our tenth category to be reverting to the two categories first listed, but there is, I am sure, a distinction. Here we are dealing with general principles, not derived *a priori* from an underlying philosophy of education, but derived rather from experience in educational practice. They become formulated as they are because they turn out to be warranted experientially, to be essential if practice is to be successful. What I have in mind is the sort of treatment found in Bobbitt's discussion of the supervision of city schools (12, I, 1913), the report on silent reading (20, II, 1921), and the report on reading (24, I, 1925), likewise the report of Coxe's committee on the grouping of pupils (35, I, 1936).

11. Specific Rules, or Maxims, of Educational Procedure Formulated on the Basis of All Available Evidence

This eleventh category is not identical with the tenth. The formulated statements are statements that deal with specific details of practice and they are based upon a survey of all the facts that can be assembled (chiefly upon the outcomes of experimental study).

There are five of the Society's contributions that serve as excellent instances of this type of work. I refer (1) to the "Fourth Report of the Committee on Economy of Time in Learning" (18, II, 1919), and especially to the chapters by Freeman (writing), Gray (reading), Horn (spelling), Monroe (arithmetic), Ayer (drawing), and Seashore (music); (2) to Henry's study of "Classroom Problems in the Education of Gifted Children" (19, II, 1920), which closes with eighteen specific recommendations; (3) to the two reports on reading (24, I, 1925 and 36, I, 1937), produced under the chairmanship of W. S. Gray, which fairly bristle with procedures endorsed by the committee; and (4) to the study of the textbook (30, II, 1931), prepared under the chairmanship of Edmonson, which concludes with twenty-two specific recommendations.

It is not a chance coincidence, I think, that these yearbooks have been particularly influential and remain still much in demand. The

inescapable conclusion is that studies that can be pushed through to the point of warranting definite, workable formulations pointed toward the improvement of practice are of special value in transmuting the more 'academic' type of approach into better educational thinking and practice in our schools.

12. Stress upon the Quantitative: the use of Scales, Standardized Tests, and Other Forms of Measurement

The idea that educational progress demanded the setting up of quantitative standards, the development of tests of achievement, and the use of score cards and similar scales appears first (in our yearbooks) in Bobbitt's discussion of "The Supervision of City Schools" (12, I, 1913). Not that Bobbitt used these methods; rather he argues that such quantitative aids are essential for a truly precise and effective supervision of the work of teachers and pupils.

Many notable yearbooks of the Society deserve mention in our twelfth category. Two have dealt directly with the quantitative approach as their subject matter; namely, "The Measurement of Educational Products" (17, II, 1918) and "Intelligence Tests and Their Use" (21, 1922). The method of approach has been excellently utilized in five of the 'one-man' yearbooks, that by Boyce on measuring teachers' efficiency (14, II, 1915), that by Holley on factors favoring persistence in school (15, II, 1916), that by Pittenger on factors conditioning college success (16, II, 1917), that by Henry on gifted children in the classroom (19, II, 1920), and that by Hudelson on measuring English composition (22, I, 1923). It is likewise a characteristic method in all four of the well-known reports of the Committee on Economy of Time (14, I, 1915; 16, I, 1917; 17, I, 1918; 18, II, 1919), as well as of the two influential volumes on reading (24, I, 1925; 36, I, 1937).

I cannot forbear special mention in this connection of the Terman yearbook on "Nature and Nurture" (27, I and II, 1928), which is, in my opinion, the most scholarly, though doubtless the most difficult, of the Society's contributions to the science of education—I have in mind especially the two notable reports of research made by Freeman and Holzinger and by Miss Burks, and I have likewise in mind Terman's plea to the reader, begging him to strive for as complete intellectual detachment as possible. "How absurd after all," says Terman, "is the attitude of mind which would force truth into any kind of preconceived

mold, when only truth that is genuine and undistorted can give us the control over human nature and human destinies that our various institutions, including the school, are intended to exercise."

13. Extended and Intensive Investigation, Conducted with
Every Available Scientific Precaution

The account in the preceding paragraph of the Nature and Nurture investigation indicates the sort of contribution that is in mind in formulating the heading for this thirteenth category. A yearbook thus based upon thoroughgoing investigation may not succeed in writing the word FINIS upon the problem investigated, but it can at least make notable progress in defining factors, delimiting their conditions of operation, locating the aspects needing further scrutiny, and can commonly supply prescriptions of educational procedure that are sounder than any previous ones and that are likely to endure for a long period. That means a real contribution to educational knowledge. Within varying degrees of approximation, investigations of this sort will be found in such yearbooks as those by Boyce, Henry, Holley, and Hudelson, as well as in the Terman yearbook. Obviously, the category as I have formulated it favors the intensive study by one man or by a small group of a delimited field; it tends to exclude educationally equally valuable studies aiming to collate facts from broad fields like reading or arithmetic.

14. Use, for Securing Data, of the Method of Interviewing, Conferences, or Visitation, and of the Method of Case Studies

This category ought logically to be presented as a subordination of more general methods of approach already listed, but it is introduced here to call attention to the appearance in certain yearbooks of a special procedure. Thus, in Holley's investigation of the relation between persistence in school and certain environmental factors he personally visited 234 homes to increase the reliability of the data afterward to be subjected to statistical treatment.

Case studies were extensively used, in many instances with appropriate checking of subsequent developments, in the yearbook on gifted children (23, I, 1924) and in the yearbook on nature and nurture (27, 1928). Where these approaches can be utilized without inordinate demands on time, they would seem to afford one method of maintaining closer contact with reality and consequently of checking the tendency

sometimes observable in educational studies to let the collection and treatment of data become so much ends in themselves as to turn into a sort of academic orgy of meticulous investigation, too often leading nowhere save to the solemn announcement of a conclusion that any person of common sense would know at the start.

15. Collection of New Materials of Instruction

In cataloging certain yearbooks as contributions to education it becomes clear that their aim is primarily that of gathering new materials of instruction—projects, lesson plans, reference materials, etc.—and making these more available to the rank and file of supervisors and teachers. Some of these collections are of a ‘blanket’ or ‘buckshot’ variety; anything concocted by a local teacher and said to be worth while has been gathered in, sorted approximately by school grade, and published for others to use if they wished. The two yearbooks on “New Materials of Instruction” (19, I, 1920; 20, I, 1921) approximate this type of contribution to the enlargement of the school’s curriculum. Less extended collections of new materials will be found in the “Report of the Society’s Committee on Silent Reading” (20, II, 1921), in Section II of the yearbook on “The Social Studies” (22, II, 1923), in the yearbook on preschool and parental education (28, 1929), and in the two reports on reading (24, I, 1925; 36, I, 1937). It appears to me axiomatic that the value of this type of contribution is primarily conditioned by the care with which the collected material is analyzed, sifted, and organized for presentation—which leads directly to our next category.

16. Presentation of New Educational Materials Specifically Selected and Organized to Form New Programs of Instruction Directed toward Defined Objectives

What is meant by this sixteenth caption has already been made clear. Excellent examples of this sort of recommendations for laying out of educational programs may be found in the two reports on reading (24, I, 1925; 36, I, 1937), the yearbooks on individual differences (24, II, 1925), on safety education (25, I, 1926), on extra-curricular activities (25, II, 1926), on teaching science (31, I, 1932), on teaching geography (33, 1934), and on teaching music (35, II, 1936).

17. Dealing Expressly with Individual Differences, Diagnosis, and Remediation

Like the two preceding categories, this seventeenth one pertains to the content rather than to the method of approach featured in a given yearbook. There are two yearbooks given over entirely to this theme; namely, the report of Washburne's Committee on "Adapting the Schools to Individual Differences" (24, II, 1925) and the report, ten years later, of Brueckner's Committee on "Educational Diagnosis" (34, 1935). Though not so labelled in its title, the same can be said for the report of Coxe's Committee on "The Grouping of Pupils" (35, I, 1936). Again this theme is to be found in sections of considerable length and importance in each of the two reports by Gray's committees on reading (24, I, 1925; 36, I, 1937), in the report of Knight's Committee on arithmetic (29, 1930), and in the report of Meek's Committee on preschool education (28, 1929, Part II, especially Section 2).

18. Consideration of the Training of Teachers

The consideration of the training of teachers is a matter of content and without any logical significance in our series of captions; nevertheless, it seems worth while to call attention to the number of yearbooks, nearly all of them published within fifteen years, in which an extended chapter or several chapters are devoted to this aspect of education. The number includes our published material on vocational education (23, II, 1924), preschool education (28, 1929), arithmetic (29, 1930), teaching science (31, I, 1932), teaching geography (32, 1933), teaching music (36, I, 1937) and gaining international understanding (36, II, 1937).

V. SOME COMMENTS IN CONCLUSION

It would be futile to try to summarize here what is already a summary of the 67 volumes published by the Society since 1902. It may be more useful to indulge in a few comments about the yearbooks, with reference especially to their merits as contributions to educational progress in the large.

1. The range of method exhibited is wide; at the one extreme are yearbooks that embody almost entirely expressions of personal opinion; at the other extreme are yearbooks that employ the most rigorous types of controlled experimentation and statistical treatment of data;

almost every between-lying type of approach is illustrated in the remainder.

2. It is tempting to generalize the chronological sequence of these various types of approach. Indeed, if considerable allowance were made for the exceptions and the overlappings, a case could be made out for six stages like these:

(1) a stage characterized by a predominance of individual opinion or of pooled opinion, becoming probably progressively more expert;

(2) a stage characterized by the injection of quantification and featuring assemblages of data in historical summaries, analyses of reports, surveys of practices, outcomes of questionnaires, and the like;

(3) a stage characterized by insistence upon refinements of statistical method, upon measurements, scales, and standardization, culminating in recipes, practical rules, remedial devices, and numerous instructional and administrative recommendations;

(4) a stage characterized by the appearance of new techniques, like the interview, visitation, the case study, less precise but in a way more comprehensive and more ambitious than the methods of the third stage;

(5) a stage characterized by attempts to formulate objectives more recondite than factual acquisition, to analyze the learning processes for skills, attitudes, and sentiments regarded as potentially teachable, and to lay out the instruction accordingly in a given field of subject matter longitudinally throughout the school grades; *e.g.*, in arithmetic, geography, science; and possibly,

(6) a stage characterized, rather curiously, by a return to a considerable extent, to the approach used in the first stage—witness, for instance, the yearbooks on activism, on music, on international understanding, and perhaps the current volume on guidance. This swing back toward opinion, granted there be such a swing (as has already been intimated in Section IV, Subsection 1 of this chapter), might be conditioned by some intrinsic cycle of method, some necessity of intellectual progress; it seems to me more likely, however, to be conditioned by the attempt to attack new and broader problems for which at present we lack precise techniques of investigation, in which case the resort once more to expression of opinion is just an accident.

3. While not all the yearbooks meet the criteria posited for contributions to the scientific movement in education, nevertheless the series is singularly free from the piddling type of educational study—

unsystematic, inconclusive, and apologetic—that has justly been ridiculed by our colleagues in the more rigorous disciplines.

4. The series has also exhibited a satisfying objectivity, in the sense that it has been singularly free from anything smacking of propaganda (in the derogatory sense of that term), or from self-advertising, or from commercialism.

5. The tendency in recent years has been strongly toward yearbooks prepared by committees whose personnel has been sanctioned and whose work has been critically followed by the Society's Board of Directors. This policy has been unquestionably advantageous, particularly in the case of problems of such breadth and complexity as to demand division of labor.

6. The persistent effort of the Board of Directors to make appointments in such a way that the yearbook committees should be "calculated in their personnel to ensure consideration of all significant points of view" has been visibly fruitful in the yearbooks themselves and to that extent has undoubtedly increased their value as contributions to educational science.

7. Although this outcome has not been brought out in the body of the chapter, it is worth mentioning here that nearly every person who has served on a yearbook committee of the Society has afterward testified with enthusiasm to the personal and professional value of this type of educational activity. Almost invariably workers on a yearbook committee have come to reconcile many divergencies and mutual misunderstandings and to reach unexpected agreement with respect to issues upon which they seemed at first hopelessly divided. (If rumor is to be believed, Harold Rugg achieved this happy outcome by locking his Curriculum Committee in a hotel room, pocketing the key, and announcing that the door would not be unlocked until each member of his committee signed a protocol of agreement on general principles.)

8. The high 'scores' attained, however, by many of the 'one-man' studies (when checking the yearbook contributions against the criteria set up to test the amount of scientific attitude and method exhibited) suggests to me that there is something to be said in favor of encouraging the publication of yearbook studies of that type, especially when the problem attacked is relatively delimited and specific in nature. We seem to have avoided or neglected the one-man study in favor of the yearbook-committee report.

(The difference had in mind is rather striking; for example, the First Yearbook, Part I, was written by one person; the First Yearbook, Part II, by one person. In the yearbook on arithmetic, there were thirty-four contributors; in that on geography, forty-nine contributors; and in that on vocational education, over fifty contributors.)

9. Taken as a whole, then, the Society's yearbooks constitute a contribution to the scientific movement in education, with respect both to content and to method of approach, of which the Society need not feel ashamed.

CHAPTER XXII

GENERAL METHODS: HISTORICAL, COMPARATIVE, AND DOCUMENTARY RESEARCH

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I. THE METHODOLOGY OF HISTORY

The methods employed in writing the history of education are, of course, essentially the same as those employed in writing the history of any other phase of human activity. Whether history be regarded as a science or not, it is true, nevertheless, that the historian is required to apply rigid principles of scientific method to the evaluation of his evidence. Although the conclusions of the historian may lack the exactness of the conclusions of the natural scientist, the methods of the historian are no less critical and objective. The nature of his evidence and of the subject matter of his investigation places on the historian a special obligation to employ every effective principle of scientific procedure at his disposal. Like the natural or experimental scientist, he relies on observations, but the observations with which he deals are not direct; they are not his own, there is always another mind with all its bias, prejudices, and misconceptions between him and the object of his investigation. One cannot make a direct observation of Julius Caesar; one has to rely on what Caesar said of himself, on records of his acts, or on what his contemporaries had to say of him. Moreover, the natural scientist deals with observable objects or things and with the discovery of the rule, or law, governing their movement or change; the historian deals with unique events, with the complex processes of man's behavior in organized society. It is for these reasons that historical and documentary research require of the investigator a rigid application of the scientific method. Much of the history of education in this country suffers from the fact that those who undertook to write it failed to bring to their task a broad scholarship and an adequate training in methodology.

History, along with the other social sciences, may or may not be a 'science,' according to one's definition of that term. If science requires the discovery of fixed laws or the arrival at conclusions that can be verified experimentally, it is obvious that history does not come within the meaning of the term; but if critical and objective methods of inquiry are the essential characteristic of a science, history is entitled to be regarded as one of the sciences.

Beginning with the work of Niebuhr, Ranke, Baur, and A. F. Wolf, critical methodology in history has been developed and refined during the past century. Essentially, the principles of method in history are directed to two ends: (1) the establishment of the facts, and (2) the interpretation of their meaning. But the processes of historical methodology are far more difficult than this simple statement would seem to imply. In the first place, facts are not easy to establish. Is the document upon which one relies authentic or a forgery? Did the author of the statement intend to tell the truth, was he competent to tell it, did he have a bias of one kind or another, and did he record his observations at the time or years later? Moreover, the investigator must require of himself the same objectivity he requires of his witness.

But facts in and of themselves have little or no meaning; significant meaning comes from the application of fertile imagination to the evidence in hand. As Stuart Rice has suggested, "the flow of events in their entirety escapes the perception of the most gifted." Facts, to have meaning, must be given an orientation; they must be ordered in a meaningful configuration. The form this configuration takes is largely conditioned by the assumptions and concepts of the author. He who asserts that he takes his facts as he finds them is either dishonest or deluded. It is perhaps not too much to say that recorded history is merely a body of documented concepts. The assumptions and concepts of an investigator not only influence his method; they are a part of it and should be regarded as such.

II. THE DEVELOPMENT OF THE HISTORY OF EDUCATION

1. Stress on Biography

Each generation views the past in the light of its own dominant concepts; it examines and re-examines the evidence of past events, selects and arranges it into such patterns as best frame the present interest. During the latter part of the nineteenth century such history of education as was written found its center of interest in the ideas and pro-

nouncements of educational theorists and philosophers. Most American writers in this period followed the example of the German historian, Karl von Raumer (45)¹; they gave an account of the life and philosophical concepts of educational leaders, but they failed almost entirely to relate education to the other elements in the cultural pattern, and they failed to give any adequate picture of the actual functioning of the schools.

2. New Conceptions of the History of Education

About the turn of the century a new conception of the content of the history of education began to appear. Thomas Davidson's *A History of Education* (11), published in 1900, was the first general historical treatise that was not mainly biographical and that attempted to trace the development of education as a part of human evolution. It was, however, the work of Paul Monroe and his students at Teachers College, Columbia University, that was soon to set the pattern for the writing of the history of education in this country for the greater part of the next generation. Monroe's *A Textbook in the History of Education* (39), which appeared in 1909, was a scholarly effort to show the relation between educational development and the other aspects of the history of civilization. Monroe made a substantial and lasting contribution in relating educational development to broad social and intellectual movements.

Since 1900, there has appeared a voluminous literature on the history of education. Some of the work was well done and represents scholarly contributions; much of it was amateurish and of no great value. The history of education in this country has been characterized, in the main, by the treatment of education in more or less isolation from the economic, social, and political changes that have occurred in American life. Much that is written is a detailed account of some phase of educational development, with little awareness on the part of the writer of the social setting in which that development occurred. Educational historians, like educators in general, have been so preoccupied with what has gone on within the confines of education itself that they have scarcely been aware of the beating of social forces on the school from without. To this statement, however, there have been notable exceptions. Carlton (5), in a pioneer work, presented a scholarly treat-

¹ Numbers in parenthesis following the names of writers and the titles of contributions refer to the numbered bibliography at the end of this chapter.—*Editor*.

ment of the economic factors influencing education during the three decades ending in 1850. Jernegon (23, 25, 26) has contributed much to an understanding of the social, economic, and political background of education in the Colonies. Both Cubberley (7) and Knight (32), in their general histories of education in the United States, have attempted with some measure of success to relate education to the social order in which it has developed. Reisner (47) has treated in considerable detail political influences on education, and Counts (6) has made a contribution to our knowledge of the social foundations of education. Judd's *Problems of Education in the United States* (28) may be cited as a noteworthy attempt to relate education to recent social change. Other examples might be cited as evidence of a new approach to the history of American education.

From the foregoing account, the reader may have been lead to underestimate the contributions to the history of education that have been made in this country. The truth is that historical and documentary research have made available a vast amount of reliable information with respect to the development and functioning of our educational institutions. There is scarcely an aspect of educational activity in which some significant investigation has not been completed.

While no definitive history of educational thought in this country has yet been written, numerous studies have been made, many of them of excellent quality, of the educational ideas of outstanding leaders, statesmen, and publicists. Hansen's account (19) of the dominant ideas of the late eighteenth century and of our first effort at educational planning, Honeywell's excellent treatment (22) of the thought and work of Jefferson in the field of education, and Curti's searching analysis (9)² of the social ideals of American educators may be cited as illustrations of excellent studies in this area. The history of educational thought in Europe and of the influence of old-world theorists on American practice have received extensive treatment at the hands of a number of writers.

3. Treatment of Educational Policy

The development of educational policy as that policy has worked itself out through religious, private, and public agencies of control has

²It is not to be assumed that the writings cited here or in later passages as illustrations are the only notable works on the topics being discussed. In fact, in many instances other writings equally meritorious might be cited as illustrations.

received extensive treatment. The religious and moral elements in American education have been treated in a number of excellent studies as, for example, in those of Fleming (15), Holtz (21), Stewart (54), and Smith (53). The educational activities of various religious groups have been treated extensively and thoroughly.

The history of the educational work of private and philanthropic agencies has not received exhaustive treatment, but there are a number of excellent studies in this field. Seybolt (49, 50), for example, has made an extremely significant investigation of private and evening schools in the Colonial period, and the work of Bourne (3) and of Reigart (46) may be cited as examples of valuable studies in the history of the work of philanthropic agencies. The development of education under public control has been subjected to extensive and detailed treatment. Many phases of the history of the relation of the state to education have been subjected to rather thorough investigation.

4. Education in Different Regions

The history of education in the different regions of the United States has been treated in a number of illuminating studies. Various phases of the development of education in New England have been investigated by Jernegan (23, 24, 27), Small (52), and numerous other writers. The history of education in the South has been extensively treated in the works of Knight (33) and Dabney (10). Mention should also be made of the numerous state histories of education, although most of them fail to measure up to high standards of scholarship. There are a large number of excellent studies of some particular phase of a state's educational policy, but there are only about eight satisfactory general historical accounts of education within a state.

5. School Administration

Most of the aspects of school administration have been the subject of intensive investigation, although much still remains to be done in this phase of our educational history. The monographs of Suzzalo (55) and Updegraff (61) may be cited as illustrations of excellent studies in the history of local school administration. Other examples of meritorious studies in local administration are the history of the city superintendency by Gilland (17) and of the public-school principalship by Pierce (43). There is no comprehensive history of school support, but considerable attention has been devoted to it in a number of standard

manuals on school administration. More specialized treatments are found in the works of Cubberley (8) and Swift (56, 57, 58). Cubberley's *State School Administration* (8) contains a vast amount of information on varied aspects of state and local administration.

6. Educational Institutions of Various Types

There is a voluminous literature on the history of the various types of educational institutions. Despite the large number of volumes that have appeared on the history of higher education, there is still no satisfactory general treatment of the subject. There are, moreover, few really adequate histories of individual institutions. Morison's exhaustive and scholarly history of Harvard University (40, 41) is perhaps the only example of a thorough treatment of the history of a single institution. The history of secondary education has been written more satisfactorily. The Latin grammar school has received considerable attention in such works as those of Small (52), Brown (4), Shipton (51), and Kandel (30). The academy movement has been treated in some detail by a number of writers, notably Brown (4), Knight (33), and Miller (38), but a comprehensive history of the movement is still to be written. The origin and development of the high school and the expansion and democratization of secondary education have received the attention of a large number of writers whose work is of high quality. Illustrations of substantial contributions to the history of institutions for the education of teachers may be found in the work of Gordy (18), Pangburn (42), and Mangun (35). The growth and decline of the manual labor movement has been treated by Anderson (1).

7. The Curriculum and Methods

The history of the internal operations of the schools has been studied by numerous persons, but as yet no one has produced a comprehensive account of the development of the curriculum or of methods of instruction. Valuable studies have been made of the teaching of most of the school subjects, such as reading, history, arithmetic, grammar, and art. Significant investigations have been made, too, of the development of the curriculum for a definite period of time or for a limited geographical area. The influence on American practice of the ideas of Rousseau, Herbart, Pestalozzi, and Froebel has been investigated with considerable thoroughness, as has also the use of textbooks, especially in the Colonial period.

8. Other Special Studies in the History of Education

Many aspects of the relation of the federal government to education have been studied rather exhaustively. The same is true of the history of the education of women. The education of the dependent classes through the institution of apprenticeship has been treated extensively by Jernegan (27) and Seybolt (48). There is no exhaustive work on the education of Negroes, but Bond (2), Woodson (63), and others have made significant contributions in this field.

9. Legal Aspects

Many of the constitutional and legal aspects of education have been subjected to thorough investigation. The work of Matzen (36) may be cited as an example of a careful analysis of the constitutional provisions relating to education. The principles of the common or case law relating to public-school administration have been reduced to systematic organization in the studies of Trusler (59), Edwards (12), Garber (16), Punke (44), Weltzin (62), and many others. Significant studies of the legal basis of higher education have been made in numerous articles by Chambers, by Elliott and Chambers (13, 14), and by Hill (20). Valuable detailed accounts of the history of educational legislation have been written for a considerable number of states.

III. COMPARATIVE EDUCATION

During the past two decades, considerable interest has developed in this country in the study of comparative education. The methods employed are essentially those of the history and philosophy of education. Emphasis is being placed on the cultural, social, political, and economic backgrounds that determine a people's educational philosophy; and an attempt is being made to discover the educational problems of various peoples and to arrive at an understanding of how these problems have been and are being met. Among the notable contributions to the literature of comparative education are the Educational Yearbooks of the International Institute of Teachers College, Columbia University (31), published annually since 1924. They contain a storehouse of information with respect to educational conditions, movements, and trends in foreign countries. The most valuable general systematic treatment of comparative education is the scholarly work of Kandel (29). As the author indicates in the *Preface*, his purpose was to "discuss the meaning of general education, elementary, and secondary, in the light of the

forces—political, social, and cultural—which determine the character of national systems of education.” The work of Tugwell and Keyserling (60) contributes much to our understanding of the social objectives of education in other countries and of the means employed in implementing these objectives. Mention should be made, too, of the highly important series on civic loyalty, edited by Merriam (37). These volumes are indispensable to an understanding of the objectives and processes of civic education in the countries investigated.

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CHAPTER XXIII

GENERAL METHODS: THE SOCIAL SURVEY AND THE STUDY OF COMMUNITIES

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Rapidly changing social and economic conditions have created community problems that social and civic leaders have felt could not be intelligently solved without more basic and integrated information than is usually available. Impetus was given to the social survey by this desire to obtain actual facts concerning existing conditions in order to formulate an active program for the betterment of the community. Alert educational leaders have seen in the social survey, no less than in the educational survey, mandates for modified curricula and practices to make education a more potent community force.

Though the survey of the city of Pittsburgh, made in 1907, is recognized as the first municipal social survey of outstanding importance in this country, it did not spring from the ground full-grown, but was preceded by a number of surveys in the nineteenth century. The earliest of these was made in 1843 when the General Assembly of Rhode Island, seeking to better the educational program offered in the public schools, passed an Act "to provide for ascertaining the conditions of the Public Schools of this state, and for the improvement and better management thereof."¹ Dr. Henry Barnard was employed to direct this study and pursued his inquiry by careful consideration of the following: organization, schoolhouses, school attendance, classification of schools, agricultural districts, manufacturing districts, and city districts. In his report he discussed the teaching force, quality of classroom instruction, courses of study, financial administration, and educational extension. Upon his recommendation at the close of the

¹G. F. Wells. "First school survey." *Educational Review*, September, 1915, p. 166.

survey the legislature passed, with but few changes, his bill revising the school code. Later, as Commissioner of Schools, he effected still other changes that his survey had indicated as desirable. This Rhode Island survey, frequently spoken of as the first American school survey, was the forerunner of the survey as we know it today.

While a number of surveys were made in the years following the study of the Rhode Island public schools, it was not until the Pittsburgh survey in 1907 that the idea of social or community surveys was effectively employed. This survey, conducted by Paul U. Kellogg of the Russell Sage Foundation, in coöperation with a number of local agencies, presented a comprehensive picture of social conditions in Pittsburgh.² Attention was directed to such matters as wages, hours of work, health and sanitation, housing, taxation, the public schools, the crime situation, and playgrounds and recreation. As a result of this survey many improvements were instituted in various phases of community life, but one of the most notable was the complete revolution of the school system. The administrative organization was thoroughly changed to provide for more central control and direction; school buildings were remodeled and repaired; revisions were made in the curriculum to effect a more practical course of study; greater emphasis was laid on medical attention given to the students; opportunities for recreation were increased. These are a few of the outstanding improvements that were effected.

From these beginnings the social survey has come to be a valuable instrument in determining the proper line of attack with which to combat social and economic problems. And the problems of education that are interwoven with the social and economic life of the community have been given considerable attention. Inquiries have been directed toward all phases of the educational system—costs, financial management, school equipment, professional qualifications of teachers, curricula, recreational and health facilities, and other matters related to the effective conduct of the schools.

In 1914 the Russell Sage Foundation was responsible for a large and unusually valuable survey of Springfield, Illinois.³ Under the direction of Dr. Shelby M. Harrison a thorough investigation was made of the va-

² Edward T. Devine and Others. *Pittsburgh District: Civic Frontage*. (Russell Sage Foundation: New York City, 1914. 554 pp.)

³ Shelby M. Harrison. "In Lincoln's home town—How Springfield survey went about getting results." *Survey* 37: February 3, 1917, 503-513.

rious fields of social and economic experience that go to make up our community life. It is interesting to note the method pursued by Harrison in carrying out this study. These were the steps he took: "(1) investigation, (2) analysis and interpretation, (3) recommendation, (4) convincing the public, (5) community action, (6) follow-up work."⁴ In describing the Springfield survey, he said: "The social survey . . . is a scrutiny of such individual and related subjects as knot themselves into the community problems."⁵ With regard to the effects of the study on the educational system of Springfield a number of the recommendations of the survey were adopted. The junior high school was incorporated into the school system; courses of study were revised; modern high-school buildings were erected; lighting, ventilation, and general sanitation were improved; the number of teachers in manual training was doubled; and school libraries were established.

In Buffalo, New York, a survey of adult education was conducted in 1926, under a grant from the Carnegie Corporation of New York. Though not strictly speaking a social survey, it differed from the conventional educational survey. This survey was made by the Buffalo Educational Council, which was composed of twenty-nine local non-profit institutions and organizations that offered formal or informal educational opportunities to adults. The Council conducted a three-fold survey program: (1) it examined the program of each member institution; (2) it formed five committees to study the total community offering in such fields as professional and vocational training, fine arts, citizenship, etc., and (3) it analyzed nearly 10,000 questionnaires filled out by students and teachers. No outside help was used; it was wholly a local effort.

Though that survey was primarily concerned with educational opportunities for adults, it was clearly recognized that such opportunities were often necessarily dependent upon facilities and staff established for the benefit of other than adults.

Ultimately the Council adopted seventeen recommendations,⁶ many of which were later carried out, viz.: (a) that a Bureau of General Information concerning educational opportunities for adults be established in the Buffalo Public Library; (b) that the Grosvenor Library

⁴ *Ibid.*, p. 507.

⁵ *Ibid.*, p. 507.

⁶ C. S. Marsh. *Adult Education in a Community*. (American Association for Adult Education: New York, 1926. 192 pp.)

(a reference library supported by taxes and endowment) establish a Bureau of Information regarding public lectures, etc., maintain a central calendar of such events, and assist in the arrangement of split engagements for speakers or entertainers; (c) that the University of Buffalo establish a School or Department of Fine Arts in coöperation with the Buffalo Fine Arts Academy and other similar organizations, a School of Education, and a School for Social Workers; (d) that the Buffalo Public Library organize more formally its advisory service; (e) that the Y.M.C.A. relinquish instruction in the field of business and center more particularly upon such neglected fields as foremanship training, vocational guidance, etc.; and (f) that the Buffalo Fine Arts Academy add to its staff persons qualified to lecture, write, and teach in the field of art, in order that its art collection might be more adequately interpreted to the city.

Here then was the formation of a council interested only in adult education, making pointed recommendations that resulted in the discontinuance of needless duplication and the establishment of greatly needed new opportunities that materially enriched the cultural resources of the city of Buffalo.

Perhaps the community study best known to the general public is that of Middletown, made in 1925 by Robert S. Lynd and Helen Merrell Lynd, and followed in 1935 by their book, *Middletown in Transition*. Because this study is so well known it will not be analyzed here. It is worthy of note in passing, also, that the youth of Middletown (Muncie, Indiana) have been studied by the American Youth Commission.

That surveys have become a popular method of investigation is unquestionable when it is remembered that well over three thousand of them have been conducted in various parts of the United States. They have varied in scope, method, reliability, and in the extent to which results have been utilized. Though some persons feel that the cost of many surveys has far outweighed the benefits derived from them, others feel that the cost has been justified in view of the development of techniques of social investigation and the resultant good to communities.

The most notable of the recent surveys is a study of youth in the State of Maryland by the American Youth Commission of the American Council on Education. It consisted chiefly of personal contact with individual youth. This was a new departure in community surveys,

which have ordinarily placed chief emphasis on the service rendered by various organized institutions and agencies. A questionnaire was used by trained interviewers to secure personal records of over 13,500 youths between the ages of 16 and 24 years, of whom 10,858 were out-of-school youths. The inquiry related chiefly to education, occupations, health, recreation, economic status, and home conditions. This direct study of youth was supplemented by special reports on education, juvenile delinquency, and recreation, the latter in coöperation with the National Recreation Association.

Keeping in mind the fact that the Maryland survey was not a school survey but a study of all the problems in the care and education of Maryland youth, it is pertinent to note some of the conclusions that grew largely out of examination of the statements of those interviewed.⁷ These are noteworthy recommendations: (a) community agencies for the vocational adjustment of youth; (b) vocational and educational guidance for all youth, those out of school served through school and community coöperation; (c) coöperative, part-time schooling provided by school and business and industry; (d) experimentation with new types of educational opportunities within existing schools, or in new types of schools; (e) increased health and school nursing; (f) special provision for atypical children; (g) cumulative follow-up of all who leave the secondary school, by graduation or otherwise; (h) encouragement and extension of post-graduate study in high schools; (i) accelerated change of small high schools from the traditional program; (j) consolidation of small high schools where possible; (k) public junior colleges; (l) better library facilities in county high schools; (m) more attention to fine and practical arts; (n) education in citizenship to have the central position in the program of studies.

Of particular significance is the fact that the Maryland General Assembly has authorized the Governor to appoint a Maryland Youth Commission "to receive and study the report of the American Youth Commission and such other data as may be available and to recommend to the next General Assembly such plans as may be considered necessary to meet existing needs."⁸

As an example of the way in which broad social studies may make

⁷ From Payson Smith and Frank W. Wright in *The Educational Opportunities of Youth in Maryland*. (Unpublished preliminary report to the American Youth Commission of the American Council on Education, 744 Jackson Place, Washington, D. C. 1937)

⁸ Maryland State Legislature, House Joint Resolution No. 23.

their impact upon educational policy, the work of the American Youth Commission may be further cited. The Commission is composed largely of prominent laymen.⁹ After nearly two years of examination of surveys and studies of youth problems, including unemployment, health, recreation, guidance, and related subjects such as rural youth, Negro youth, C.C.C. camps, in addition to studies previously mentioned, the Commission, at its May, 1937, meeting, expressed its considered judgment in a series of resolutions. These resolutions, having large implications for education, read as follows:

1. It being understood that young people should receive formal education or training at least until the age of sixteen, the Commission accepts the principle that society has a further, peculiar, and increasing responsibility for the education, welfare, and development of young people up to the age at which they may be able to enter gainful occupations.
2. "An education for the common life," with a core of common materials for all, but adapted to the varying abilities and aptitudes of youth, should be the basis for the formal educational program. From the end of the period of formal education to the age of twenty-one the responsibility may be met by less formal and more flexible means. After the age of twenty-one the responsibility of society may become a special part of its relation to adults generally. It is obvious that the time must come when the individual accepts the primary responsibility for his own education and welfare. Economic and other conditions affect this period. Under existing conditions the ages suggested above are believed to be proper.
3. The problems arising out of the acceptance of these principles are:
 - (a) That of the necessity of building new curricula in the schools and the organization of the educational system to meet modern needs.
 - (b) That of the creation of appropriate agencies for less formal training.
 - (c) That of financing the program.

By the use of the survey, communities are enabled to plan more scientifically for their future growth—for a "peaceful civic renewal."¹⁰

⁹ Members of the Commission are: Will W. Alexander, Ralph Budd, Lotus D. Coffman, Dorothy Canfield Fisher, Willard E. Givens, Henry I. Harriman, Robert M. Hutchins, George Johnson, Chester H. Rowell, William F. Russell, Mrs. Edgar B. Stern, John W. Studebaker, Henry C. Taylor, Miriam Van Waters, Matthew Woll, and Owen D. Young.

¹⁰ Shelby M. Harrison. *Op. cit.*, p. 513.

There seems to be a tendency for more studies conducted by local community leaders—more self-surveys—as against those carried on by persons from the outside. Moreover, as the progressive inventory has proved its value in successful merchandising, so periodical checking is being increasingly used to keep the educational program abreast of the times.

The formal educational survey will continue to have its place. But there can be little doubt that the social survey will come to have larger implications for education. Recreation, health, crime—these and other subjects of community interest must be considered as the social survey points out their significance. As education becomes more closely related to life, the social survey will become more closely related to education.

CHAPTER XXIV

GENERAL METHODS: STATISTICAL ANALYSIS AND COMPARISON

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I. INTRODUCTION

The origins of educational statistics are well characterized by Dr. Helen Walker¹ in the following terms:

Educational statistics is the offspring of a varied ancestry. The greed of ancient kings enumerating their people for taxation; the panic of an English sovereign during the London plague; the cupidity of professional gamblers; the scientific ardor of the psycho-physicists; the labors of mathematicians and astronomers and physicists and actuaries; the enthusiasm of students of social phenomena; the disciplined imagination of the biologists; and the vision of educators planning a new science of education; from these has educational statistics descended.

In the present summary we shall make no attempt to trace the numerous methods of educational statistics from these ancient and varied sources. We shall, however, discuss certain broad topics in current usage, indicating the adaptations that have been made in educational practice. We shall also keep the treatment of these topics as simple as possible, with a minimum of formulas and mathematics.

Summaries of current statistical studies and contributions to method are readily available in the periodical literature. We shall therefore deal, not with specific studies, but with general illustrations of the applications of the various methods.

¹Helen M. Walker. *Studies on the History of Statistical Method*. The Williams & Wilkins Company: Baltimore, 1929. 229 pp. We have used Dr. Walker's book freely in preparing this chapter.

Inasmuch as this summary is chiefly concerned with educational statistics, we shall omit explicit treatment of the topics of psychophysics. Methods for determining sensory thresholds, Weber's Law, Fechner's Law, the Law of Comparative Judgment, and the like belong more properly to pure psychology. A recent simple description of these methods may be found in Guilford's treatise.²

II. THE WIDE USE OF STATISTICAL METHODS IN EDUCATION

The scientific method in education has led to the wide use of measurement and the quantitative methods of statistics. In school surveys and classroom investigations, in school accounting and school costs, in the preparation and standardization of test materials, in numerous problems of research, such as methods of learning and teaching, and in the diagnosis of special disabilities, statistical measurement and analysis have been extensively employed.

The quantitative trend in school investigation has given rise to a surprising bulk of literature including numerous school surveys and countless theses and special investigations. In order to understand this literature, it is imperative that the general student of education have a reading acquaintance with statistical method. School administrators, for example, who may not participate directly in research in their schools, should be intelligent about the methods and techniques employed in such investigations.

For all these reasons, training in the use and interpretation of statistical method has become widespread in schools of education and normal colleges. This situation is in sharp contrast to the one that exists in England where only a relatively small percentage of teachers and administrators are familiar with such scientific tools.

In the last ten years there has been very definite improvement in the quality of statistical investigations. This is probably due in part to a clarification of problems as work on them progresses, to a more thorough training in statistical method, and to avoidance of many of the earlier errors that are always prevalent in the development of a new science. There is also a growing tendency not to employ more refined techniques than the data and problem justify. Thus, if a consistent series of results occurs in the case of very small samples, we may make a reasonable generalization from this very consistency, without the formal use of sampling errors.

²J. P. Guilford. *Psychometric Methods*. (McGraw-Hill Book Company: New York, 1936. 566 pp.)

III. DEFINITION AND SCOPE OF STATISTICS

The term 'statistics,' according to Yule,³ may be thought of as having a three-fold definition: (1) By *statistics*, or *statistical data*, we mean quantitative data affected to a marked extent by many factors. (2) By *statistical methods* we mean methods especially adapted to the elucidation of such data. (3) By *the theory of statistics* we mean the formulation of statistical theories and principles and the mathematical derivation of appropriate formulas.

Yule insists upon the qualifying phrase "to a marked extent" in the first definition because statistics are not usually applied to data like those of the physicist, which are usually affected only by a relatively small residuum of disturbing causes. We venture to say, however, that this distinction is unimportant and that appropriate statistical methods may be applied to any physical or social data that are always affected by many causes. The experimenter seeks to replace the complex system of causation appearing in nature by simple systems of causation in which only one causal circumstance is permitted to vary at a time. He cannot, however, more than roughly approximate this ideal, because there will always be innumerable factors unmeasured and uncontrolled.

Experimental method and statistical method may be viewed as different aspects of a common quantitative method. In the former, special care is taken to control factors by laboratory measurement or observation; in the latter, descriptive methods are employed for summarizing the data and making allowances for unmeasured factors. Every statistical study has some of the characteristics of an experiment at the stage of the collection of the material, and every experiment upon which a generalization is to be based requires adequate statistical treatment. It has sometimes been argued that for statistical method many cases are required in order to balance the effect of unmeasured random causes, whereas an experiment may deal with a very small number of cases because of the extreme care used in controlling factors. This distinction, again, is far from sharp.

A somewhat broader view of experiment is illustrated by research in agriculture. Instead of attempting to measure accurately all the minor factors of soil fertility, moisture, and climate, the planting of a particular cereal is replicated under certain random arrangements of land plots. The net effect of such a design is to distribute in random

³ G. U. Yule. *An Introduction to the Theory of Statistics*. (Charles Griffen and Company, Limited, London, 1922. 425 pp.)

arrangement the minor causes unmeasured in the experiment. Some recent attempts have also been made to extend these methods to educational problems. The great advantage of this method lies in the greater control of minor factors, with greater accuracy and simplicity of treatment when appropriate designs are employed.

IV. THE NORMAL CURVE

Probably no statistical notion has been more widely applied in educational statistics than the normal probability curve. The discovery of this curve dates back to 1733, when it was first derived by De Moivre. A number of other early mathematicians, including La Place, Gauss, and Bessel, contributed to the development of the theory of probability and the theory of errors. Tables for expressing the normal curve in terms of the standard deviation were first presented by W. R. Sheppard in 1902 in the second volume of *Biometrika*; and a number of other tables have since been computed by Miss Julia Bell, by Galton, and more recently by T. L. Kelley and Ben D. Wood.

Educational statistics is greatly indebted to Quetelet for his wide use of the normal curve. He suggested that the changes from level to level might be studied by making observations on large numbers of people at different ages instead of making numerous observations on an individual as he progressed. He believed that a great variety of physical, mental, and even moral traits would be distributed according to the normal law if accurate data could be gathered. The earliest statistical investigations of educational problems in this country were largely due to workers familiar with Quetelet's investigations.

Sir Francis Galton was a great admirer of Quetelet and laid much stress on the normal curve as an important description of social phenomena. He stated that about 90 percent of distributions of human traits approximate the normal curve and that the distribution for stature gave a particularly good fit. His admiration for the curve is illustrated by the following quotation:

I know of scarcely anything so apt to impress the imagination as the wonderful form of cosmic order expressed by the "Law of Frequency of Error." The law would have been personified by the Greeks and deified, if they had known of it. It reigns with serenity and in complete self-effacement amidst wildest confusion. The huger the mob and the greater the apparent anarchy, the more perfect its sway. It is the supreme law of Unreason. Whenever a large sample of chaotic

elements are taken in hand and marshalled in the order of their magnitude, our unsuspected and most beautiful form of regularity proves to have been latent all along.⁴

Galton's enthusiasm for the normal curve is undoubtedly responsible for much of its wide use in a variety of educational problems. By means of Pearson's⁵ Chi-Square test it is possible to determine whether or not the deviations of an observed curve from the normal differ more than would be expected in random sampling. Many observed curves have been so tested, but in the case of mental traits the distributions may be arbitrarily skewed to the left or right according to the difficulty or ease of the particular material of the test. Thus, the normal curve will not fit many distributions very closely, but may be used as a sort of norm to determine a discriminative test for high and low scores.

Another important application of the curve is in obtaining the weights of test items or the total score according to the difficulty as expressed by the percentage of pupils failing. Tables for scaling individual test items are to be found in Rugg's text⁶ and several others. In McCall's T-score⁷ the total score is scaled in a manner similar to that used for individual items. These scores are determined by calculating percentages of observed cases below various class values and assigning the corresponding normal deviates; these values are then shifted to a new origin and standard deviation by the transformation

$$T = 10 \left(\frac{x}{\sigma} + 5 \right)$$

where T is the McCall score and $\frac{x}{\sigma}$ is the deviate on the normal scale.

Many distributions are expressed in verbal categories or as qualitative series. If a normal curve is assumed, such distributions may be converted into quantitative ones by determining the means of the various portions of the normal curve corresponding in frequency to the verbal categories. This method has proved valuable in quantifying a great variety of mental traits that would not be readily measured at the start.

⁴Sir Francis Galton. *Natural Inheritance*. P. 86. (London, 1889)

⁵K. Pearson. "Note on the relation of Chi-Square goodness of fit test to the standard deviation on samples of a normal population." *Biometrika*, 19: p. 215.

⁶H. O. Rugg. *Statistical Methods Applied to Education*. (Houghton Mifflin Co.: Boston, 1917)

⁷W. A. McCall. *How to Measure in Education*. (The Macmillan Co.: New York, 1923)

Galton's contribution to modern theory of test construction is again exemplified by his idea of using a measure of variability as a unit. This is essentially the method involved in a number of derived scores, such as the T-score of McCall and in the transformation

$$\frac{T - M_t}{\sigma_t} = \frac{X - M_x}{\sigma_x}$$

wherein arbitrary values are assigned to M_t and σ_t , but $\frac{x}{\sigma_x}$ is taken as an observed, rather than as a normal, deviate.

The term 'standard deviation' was first introduced by Pearson, and this measure of variability now generally replaces Galton's less reliable measure of quartile deviation. The standard deviation is the unit in which all the sampling errors of statistical constants are derived and expressed. For traditional reasons, however, it has become customary to multiply such values by .6745 to convert them into so-called 'probable errors.'

The term 'probable error,' which originated amongst astronomers in the study of errors, is inappropriate in describing normal distributions of human traits. Furthermore the word 'probable' is inappropriate, as Galton points out, since what is really meant is a sort of mid-error. Thorndike once said that some perverse mathematicians called this quantity the probable error because it was neither probable nor an error. In any event this confusing term persists like the English system of measurement.

V. MOMENTS

Pearson was the first writer on statistics to notice the analogy between the mechanical concept of moment and the statistical functions obtained by taking the sums of the n th powers of the deviation in any given distribution. Pearson's n th moment about the mean is defined as $N\mu_n = \sum x^n$, where N is the number of cases, x is the deviation from the mean, and the sum is taken over N . The n th moment coefficient is given by, $\mu_n = \frac{\sum x^n}{N}$. It is apparent that the moments for $n = 0, 1$, and 2 furnish the three common measures in statistics; namely, the number of cases, the mean, and the standard deviation squared. The third and fourth moments are also employed in fitting observed frequency distributions to theoretical curves, such as Pearson's system of frequency curves.

Probable errors of moments have been derived by Pearson and Filon⁸ and have been of very great value to many other workers in deriving formulas for the probable errors of other statistical measures. The probable errors of the first and second moments—*i.e.*, of the mean and the square of the standard deviation—have been widely used in educational statistics to determine whether the observed values (for the given sample) of these moments vary appreciably from the true values of an infinitely large number of observations. Another very useful formula is that for testing whether or not small differences in the means of samples may have arisen from chance. This formula gives the probable error of the difference between the two means.

The method of moments for fitting mathematical curves to observed frequency distributions has not been used much in educational statistics because curve-fitting is relatively rare in educational research.

Some of the most useful outcomes of Pearson's work for educational statistics include the following:

1. The correlation between means is the same as the correlation between the original measures if the sampling is random.

2. The correlation between errors in σ_x and σ_y is approximately equal to r_{xy}^2 , the square of the correlation coefficient of the original variables.

3. The standard error of the correlation coefficient is given approximately by $\sigma_{r_{xy}} = \frac{1 - r_{xy}^2}{\sqrt{N}}$.

The standard errors of a considerable number of other statistical formulae are also largely dependent upon the work of the Pearson school.

There has been a good deal of abuse in applying many of these sampling formulae, because of ignorance as to the assumptions underlying their derivatives. The problem of sampling errors in the case of small samples is a difficult one, but some very important contributions have been made by R. A. Fisher,⁹ especially in his transformation of the correlation so as to insure approximate normality of the standard error curves.

In dealing with the statistical significance of small quantities, it has been pointed out that this may not agree with practical or social

⁸ Pearson and Filon. "Mathematical Contributions to the Theory of Evolution IV." *Philosophical Transactions A CXCI*, 1898.

⁹ R. A. Fisher. *Statistical Methods for Research Workers*. (Oliver and Boyd: London, 1935)

significance. Thus a correlation of $.16 \pm .04$ would be judged statistically significant, but so slight a relationship would have no practical value in prediction.

VI. PERCENTILES

The median as a measure of central tendency was discovered independently by two men by quite different methods of approach. In 1816 Gauss suggested a simple method of computing the probable error in which he recommended that all errors be arranged in order without regard to sign. He then selected the middle one if the number of cases was odd, and the mean of the two middlemost if the number of cases was even. This value was thus the median of the absolute value of the errors. A more precise definition was later furnished by Encke.

Fechner discovered the median by a different approach. He noted first that the arithmetic mean has the property that the sum of the squares of the deviations is a minimum about that value of the variable. He then defined the median, which he called *der Centralwerth*, as such a value that the sum of the first powers of the deviations from it is a minimum. His formula and directions for computation of the median are the same as found in many current textbooks on statistics.

Galton made extensive use of the median and quartile deviation in his work. He also introduced the ideas of grades, percentiles, and ogive curves. He pointed out that if an ordered distribution of any human trait is available, then it is possible to ascertain the rank of any person in the distribution. This is essentially the idea of percentile rank.

The percentile method has been much in vogue in modern test construction, especially in the preparation of test norms. In recent years, however, tests have been standardized more and more frequently by the use of the mean, which has greater reliability (in sampling) and is much superior generally because of its algebraic character. The advantage of the median in suppressing the effect of extreme values has been frequently stressed. Most distributions, however, are fairly symmetrical and the numerical difference between mean and median is then slight. It has also been argued that, if scores properly belong in a given distribution, their effect on an average should not generally be suppressed because of extreme deviation and that they should be permitted to contribute their proportionate share to the average as is true in the case of the arithmetic mean.

The percentile method has been used extensively by Arthur Otis in the analysis of tests. Percentile ranks as scores have also been widely

used by Thurstone and others as convenient derived scores that are readily interpreted by school administrators and advisers in personnel work.

VII. CORRELATION

The method of correlation has been very widely used in educational statistics. According to Pearson, Galton is to be credited with the discovery of this method. It appears that Galton was groping for the ideas of correlation and regression in his studies of heredity in plants. One day he took a walk and was driven to shelter under a rock because of a shower. While there he got the idea of correlation and forgot all else in his great delight. Pearson suggested a commemorative tablet for the cave.

Galton used quartile deviations and graphic methods in his original treatment of correlation. Pearson used the method of moments and derived the familiar formula

$$r_{xy} = \frac{\Sigma_{xy}}{N\sigma_x\sigma_y}$$

as the 'best value' in the least-square sense. Pearson, Yule, and Filon then contributed the more general methods of non-linear correlation, partial correlation, and multiple correlation.

Although the basic formulas for the correlation of sums and differences of variables were available, no explicit treatment of this method occurred until Spearman's paper "Correlations of Sums or Differences," in 1912. Spearman also contributed a number of formulas for correlation for attenuation or unreliability, in 1904. Kelley also derived a number of formulas for dealing with what he called "fallible" scores. A complete treatment of all this work is to be found in his textbook.¹⁰

The well-known Spearman-Brown prophecy formula for predicting the reliability of lengthened tests was a natural corollary of the foregoing work. This formula was derived independently by Spearman and Brown and published in the same issue of the *British Journal of Psychology* in 1910. The formula undoubtedly led to a very great improvement in test material, because it called attention explicitly to the law of improvement in reliability. Unless the newly added material of a test is of the same reliability as the old, the formula will not give an accurate measure of the increased reliability. The formula has been checked empirically by a number of workers, and when comparable

¹⁰ T. L. Kelley. *Statistical Method*. (New York, 1923)

increments of test material are added, the prophecy formula gives excellent predictions within the range of an ordinary testing period.

The importance of revealing relationships amongst mental variables and these newly made tools for analysis have led educational statisticians to calculate enormous numbers of coefficients in the last twenty years. A large share of this work is probably nearly worthless because care was not always taken to use adequate samples and tests and to allow for such important variables as age and grade. In the last few years, however, there has been very definite improvement in this respect, especially in reporting reliability coefficients.

Among the chief uses of the correlation method in educational statistics we cite (a) reliability coefficients, usually determined by correlating two parallel forms of a test with definite statement of the age or grade range; (b) validity coefficients obtained by correlating tests with an objective measure or criterion; (c) bases for judging the predictive value of certain tests (all the intercorrelations of a set of tests are necessary in order to express one test in terms of the remaining tests in what is called a 'regression equation'); (d) basis for factor analysis of mental abilities; and (e) general measures of relationships in such problems as heredity versus environment.

Pearson called correlations between parent and child, for a given trait, "heredity coefficients." Many of these values approximated .5, which some workers have taken as a sort of norm. Mental-test correlations between parent and child often exceed this value, however. It is also apparent that such correlations are not pure measures of the intensity of heredity, because both parent and child have many environmental factors in common. Pearson's heredity coefficients might be regarded as upper limits to the values sought.

A number of other correlation methods derived by the Pearson school have been particularly useful in educational statistics. Among these is the method of contingency, which gives a measure of association for qualitative series. It is thus possible to determine the relationship between traits such as honesty, described in verbal categories, and type of character training.

In validating simple test items, wide use has also been made of a method called Biserial r . A normal distribution for the dichotomy—here success or failure on an item—is assumed. The test items are then correlated against some criterion. These coefficients are taken as standard for comparing a variety of short-cut methods for determining item validity.

VIII. THE METHOD OF LEAST SQUARES

In Encke's treatise on least squares (1832) we find among other important formulas that for determining the most probable arithmetic mean of a set of variables. Thus all variables should be weighted in inverse proportion to their squares, as illustrated in Kelley's text. Many composite tests have been built up according to this principle.

The term 'regression line' was introduced by Sir Francis Galton in connection with a problem of heredity. It has been shown that the height of sons may be predicted (approximately) from the height of their fathers by means of the line.

$$S = .5F + 34",$$

where 'S' represents the son's height and 'F' the father's height in inches. Now since the mean height of fathers and sons is 68", it is seen from this equation that a son's height (whether the father's height is above or below the mean) always tends toward, or regresses toward, the mean of the race.

Galton's term 'regression' continues to be used for any sort of curve that fits the means of the rows or columns in a correlation table, even though no problem of inheritance is to be considered.

Galton's regression lines, originally determined graphically by the use of quartiles, were more rigorously expressed by Pearson as lines with least square fit to the respective means of rows and columns in the correlation table. If such lines are not sensibly linear, then the product-moment method is inappropriate and methods such as the correlation ratio should be applied.

The multiple regression equation is a linear function of a number of (independent) variables so weighted as to minimize the error of estimate of the dependent variable. This method has been widely used in prediction problems, such as forecasting success in college from a number of predictors.

The methods of factor analysis to be discussed in the next section are all based on the method of least squares. For example, Spearman's famous Two-Factor pattern consists of a series of linear regression equations determined essentially by the method of least squares.

A method for studying causation has been proposed by Professor Sewell Wright in the form of what he calls "path coefficients." If all variables are taken in standard form (standard deviations equal to one), the coefficients in the multiple regression equation furnish the necessary values for path coefficients. If we square both members of

the regression equation, the left-hand member becomes equal to the square of the multiple correlation and the right-hand member shows the single and paired variable contributions of the tests to this total variance. In the special case in which the directions of influence are known and may be interpreted as causes, we may then determine the amount and net effect of all such causes.

As an illustration of this method we may cite an attempt to determine the causal contributions to child's intelligence from parents' intelligence and home environment. The assumed causal structure, however, is open to serious doubt, inasmuch as the causal relation between child's intelligence and his home environment is probably a reciprocal one. A safer use of this method is to interpret the coefficients as contributions to total variance, without explicit assumption as to how this contribution is affected.

IX. FACTOR ANALYSIS

A genuine contribution to statistical methodology made by psychologists and educational statisticians is the recent method of factor analysis. Although the end-products of factor analysis may be considered as multiple regression equations, the methods employed in their derivation are different from the ordinary procedure of obtaining regression equations. The primary difference is that we need not fix our attention on one variable as dependent and the remaining ones as independent, but instead, factor analysis yields a regression equation for each test in terms of new abilities (or factors). These factors may then, in turn, be described in terms of the original tests.

The basic ideas of this method are those of Professor Charles Spearman, who conceived the idea that the positive correlations amongst a set of variables might be thought of as due to some common mathematical factor. The method of least squares, as already pointed out, furnished the basis for evaluating this factor in the form of a regression equation. A number of other workers, including Kelley, Hotelling, and Thurstone, extend Spearman's idea to the case of group, as well as general, factors. Spearman and Holzinger have made a similar extension, evolving what may be called a Three-Factor theory.

At present a number of investigations are being made of the factors involved in a large battery of tests. The studies of Thurstone, Spearman, and others show that fifty to seventy-five varied tests may be thought of as made up of a small number of independent factors.

One advantage of a factor analysis is in parsimony of thought. If all the essential common-factor variances of a large battery of tests may be described in terms of a few underlying factors, there is a great scientific gain in simplicity. Such factors, moreover, may be given a meaning as definite as that ascribed to the original tests. This is accomplished in two ways: In the linear expressions (regression equations) that give the tests in terms of the factors, the coefficients of the factors show the compositions of the tests. We can thus see how much of a given factor a test contains. From such values and from a careful study of the tests themselves, we assign meaning to the factors. Furthermore, we can get reciprocal expressions that give the factors in terms of the tests; that is, the coefficients of the tests now show directly the compositions of the factors.

The dependence of factor analysis upon the method of least squares becomes apparent when we consider that no factors can really be measured, but must always be estimated. In the simplest conceivable factor pattern of a set of variables there will be at least one general factor and n specific factors. We thus have at least $n + 1$ factors of both types in a set of n equations, making an algebraic solution impossible. We can, however, estimate the factors; and this is accomplished by making use of the coefficients in the pattern, which are the correlations of the tests with the factors under the most common hypotheses. Regression equations for estimating factors from the tests may then be set up, the tests now being regarded as the independent variables in the equations.

Thus far such estimates of factors have not been very satisfactory, because in the original analysis tests highly saturated with the respective factors have not been employed. An important problem for the future is to perfect and purify tests, so that they will ultimately be much more heavily weighted with factors and finally furnish a more satisfactory basis for factor estimation.

We may venture to say that one of the chief uses to which factor analysis will be put in the future will be to investigate the special abilities and personality of a student, so that he may be guided along the proper educational and vocational lines. Those who give vocational guidance to young people too often base their advice upon relatively unsound guesses about the particular qualifications necessary for success in the various occupations. As stated by Trabue:

The schools must work in close harmony with other public agencies . . . in developing such guidance and training programs. But before any of these agencies can make substantial progress in the establishment and administration of practical guidance programs, we must have definite, verifiable data regarding the measured human traits involved in doing successfully each of the important tasks necessary in modern life.¹¹

One means of obtaining definite, verifiable data regarding the abilities required for success in various occupations is to give a large battery of tests to a reliable sample of successful men in an occupation and thus obtain a list of the essential abilities for that occupation. Into the equations of estimation of these factors we may then substitute an applicant's scores on the same tests and thus obtain a measure of his probable success in this occupation. In the same manner, and, perhaps more reliably, we could advise a student as to the best academic courses for him to pursue.

Recent methods of factor analysis have been developed along somewhat different lines by Kelley, Hotelling, Thurstone, and Holzinger, but the fundamental idea is essentially the same. It has also been recently shown that there are certain definite relations between the factors obtained by different methods. It is probable, therefore, that a much closer harmony of analysis will eventuate than is now apparent to the student of this subject.

The mathematical statisticians who have contributed to this method in the last few years have done much to refine the technique, but in the opinion of the writer the chief credit should go to Spearman for the original idea and much of the modern technique as well. Spearman's great interest in his general "G" factor, and his relatively slight interest in the group factors have led many to place him in a school apart from those interested in the general problem of group factor analysis. In recent years, however, Spearman and other workers have realized the great importance of group factors. The Unitary Traits Committee, under the leadership of Professor E. L. Thorndike, did a great deal to clarify statistical issues and to promote valuable research in this field.

¹¹ M. R. Trabue. "The bliss of ignorance in educational and vocational guidance." In *The Application of Research Findings to Current Educational Practices*. P. 253. (American Educational Research Association: Washington, D. C., July, 1935)

CHAPTER XXV

GENERAL METHODS: LABORATORY EXPERIMENTATION

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I. MEANING OF THE TERM

The term 'laboratory' has been used so loosely in educational literature that some restrictive definition should be set up at the beginning of any paper dealing with the contributions of the laboratory method to education. Just as the scientific study of education may make use of a variety of methods—experimental, historical, and comparative—so also experimentation may employ a variety of techniques, one group of which is ordinarily classified under the general term, 'laboratory method.' The prime distinction between laboratory techniques and other experimental techniques is that in the laboratory the essential factors to be investigated are abstracted from nonessential concomitant factors in the environment in such a manner that the results of the experiment may be ascribed to changes in the essential factors under consideration. Furthermore, in the laboratory special materials and apparatus of varying degrees of complexity may be employed to afford more penetrating analyses of the characteristics of the actual process of learning than are possible in the ordinary environment.

As used in education, the method is similar in general characteristics to laboratory methods in other sciences. Its success often depends upon the degree to which nonessential concomitant factors can be eliminated and an artificial situation set up in which the phenomena under investigation may be thoroughly analyzed. The commonly heard criticism that laboratory situations are artificial betrays a complete misunderstanding of the very nature of laboratory methods. The laboratory is intentionally and purposely artificial, but artificial only in respect to the nonessential in a situation.

The laboratory contributes to education by discovering truths, more or less basic, that are applicable in the classroom. To secure the values of such application, it is not necessary to set up laboratories in classrooms. Instead, the laboratory finds its truth through the rigid elimination of nonessential factors, but later tests the truth so found in situations that are as completely practical as possible. For example, the discovery of the fundamental difference between oral reading and silent reading was a product of the laboratory. Although the practical situations in classrooms had afforded thousands of opportunities for observing this distinction, it was not until the laboratory developed finer methods for penetrating to the basic characteristics of reading that the essential differences between oral and silent reading were made apparent. These differences were then translated into practicable methods of classroom teaching, but there was no transferring of laboratories to classrooms nor was there any necessity for such a transfer.

The popular tendency to use the term 'laboratory' in situations different from those just described not only indicates a misunderstanding of the scientific method but also confuses those who read scientific literature. The same confusion is often witnessed in the use of the term 'clinic,' which has recently become very popular in education. The essence of the laboratory method does not rest in the elaborateness of apparatus but in the use of apparatus to facilitate the process of abstracting the essential elements to be studied. Apparatus refines one's observations of essential factors and makes possible permanent records of elements so fleeting that they would otherwise escape analysis.

II. EARLY USE OF THE METHOD

The laboratory method as used in the study of the educative process had its beginning in the psychological laboratory set up by Wundt in Leipzig in 1878. The results of this method of dealing with problems of learning soon gave rise to the term 'the new psychology,' which was applied to a variety of kinds of objective investigation carried on in psychological laboratories. Up to the year 1900 the laboratory method was used chiefly in studying basic problems of learning, many of which were never related directly to methodology in the school. However, the early laboratory studies of memory, retention, fatigue, and reaction time, as well as the laboratory tests to determine the nature and extent of individual differences, laid a foundation that made possible the later studies of more complex mental processes involved in learning school subjects.

The value of some of these earlier laboratory studies, such as those that dealt with individual differences, did not become apparent to many people until the decade from 1910 to 1920, when they supplied the basic materials from which intelligence tests were constructed. The validity and reliability of many of the elements of intelligence tests were checked experimentally in laboratories years before they became a part of standardized intelligence examinations.

Between 1900 and 1915 much energy was expended in laboratories in studying the characteristics of the simpler mental processes. Some of the studies dealt with animal learning, while others made use of nonsense syllables in simple forms of association experiments with human beings. While these early experiments clarified the basic patterns of certain types of learning, they dealt with situations that were so simple that possible applications to school processes were commonly overlooked. For example, the fact that the human group carries on its education very largely through the use of an abstract language changes the nature of education so greatly that comparisons between the learning of children and the learning of animals for those types of work carried on in school frequently become useless. The enormous significance of the social and intellectual background of children as related to their methods of learning was recognized slowly. Once this fact became clear, the nature of experiments in education changed and laboratory techniques began to deal with the complex processes that characterize school work.

The status of laboratory studies prior to 1915 is indicated in Whipple's two-volume *Mental and Physical Tests* (1),¹ which describes many of the laboratory techniques used at that time. The word "test" in this title is too limited to indicate the significance of Whipple's material, since many of the techniques described were used to study the process of learning as distinguished from testing the characteristics of the learner. The bibliographies that Whipple appended to his chapters indicate the extent to which laboratory techniques had been applied to a wide variety of problems. The majority of the studies he cited reveal an interest in abstract problems and in basic abilities rather than any attempt to study applications of the techniques to school situations. This fact is undoubtedly very much to the advantage of later experimental work, although the practical usefulness of much of the experimentation done up to 1915 was not apparent at that time.

¹ Numbers in parentheses following names of authors or texts cited in this chapter apply to the References at the end of the chapter.—*Editor*.

The pioneer experiments of Ebbinghaus on memory were followed later by specific applications to school situations, such as studies of the conditions of drill in arithmetic by Kirby (2), and Knight (3). Furthermore, the many recent studies of part-whole learning, the effect of recall upon learning, the effect of interference factors, as well as various types of motivation, all of which have been applied to problems of learning in schools, owe much to the foundational research that was done prior to 1915. Basic laboratory studies of puzzle learning, such as those reported by Ruger (4) and Lindley (5), stimulated later laboratory analyses of problem-solving in a great variety of school situations. More examples could be cited in the learning of various types of skills. Bryan and Harter's (6) classic experiment on learning the telegraphic language has served as a model for many laboratory studies of motor learning, while Book's (7) early investigation of learning to typewrite was a valuable contribution, both in respect to technique and results.

The second and third volumes (8) of Thorndike's three-volume series published in 1913 constitute a good summary of studies carried on in laboratories by simple techniques, in many cases without the aid of any type of apparatus. Although the studies reported by Thorndike are interpreted from the point of view of an associationist psychology that has since been subject to much criticism, and though the emphasis is upon the end-products of learning rather than upon any penetrating analysis of the mental operations involved during the process of learning, the studies reported have had an enormous influence upon subsequent experimentation. The patterns, as well as the objects of study, have been widely copied by Thorndike's students.

It is unfortunate that there has been no similar comprehensive summary of laboratory analyses of the process of learning to parallel Thorndike's volume. Such studies were carried on, but they are scattered through the literature. As early as 1903 Judd (9) had written his *Genetic Psychology for Teachers*, which included some most stimulating chapters for students who were interested in analyses of the mental operations carried on in the schools. The later book by Judd (10) dealing with the psychology of high-school subjects, together with Freeman's book on the common branches (11), showed the extent to which applications could be made of the laboratory studies of mental processes. The publications by Thorndike, Judd, and Freeman have had much influence on subsequent experimentation in education. Thorndike's work has led in the direction of an application of statistical

methods to problems of learning, whereas Judd and Freeman have stimulated detailed laboratory analyses of these problems. The subsequent development since 1915 of these two lines of attack is too well known to require detailed treatment.

The statistical analyses of Thorndike have been most productive in dealing with problems of individual differences and with techniques of testing. The emphasis by Judd and Freeman upon laboratory experiments has resulted in numerous lines of attack upon the complex processes of learning, as revealed in studies of reading and arithmetic, and have been models for laboratory studies in many other fields. These studies, carried on through successive refinements of technique and apparatus, have made possible a better understanding of the process of learning as contrasted with the product of learning. They have influenced methodology in numerous ways and have supplied to many teachers an understanding of what goes on in the mind of the learner that enables them to give the learner more intelligent guidance.

III. SOME MAJOR TYPES OF RESEARCH THAT HAVE BEEN CARRIED ON BY THE LABORATORY METHOD

As has been stated earlier, it is not the purpose of this Yearbook to supply a detailed review of research during the last generation. No attempt will be made here to enumerate all the laboratory studies that have made significant contributions to education. However, in the following pages of this chapter certain major lines of research carried on by laboratory techniques will be described. These are by way of illustration only. No attempt is made to be inclusive either in the kinds of research described or in the citations to particular studies.

One of the first matters that strikes the attention of a reviewer of scientific research is the extent to which investigations of specific problems have been pursued and the degree to which particular investigators have persisted in their interests over a period of years. The most striking fact that the reviewer encounters is the lack of any persistent follow-up either of problems studied or of contributions over a period of years by the same individual. For example, Brownell (12) has shown how in the field of arithmetic the great majority of contributors to the research literature have never published more than one study. Of course, there are exceptions, like the concentration of Terman on the Binet Scale, that of W. S. Gray on the problems of reading, of Goddard and of Doll on mental deficiency.

1. The Investigation of Music

Another and a very conspicuous exception that pertains to the field of laboratory experimentation and that brings out the valuable results consequent upon a long-time interest in a problem of research, is furnished by Seashore and his students at the University of Iowa in their investigation of music. The laboratory analyses by this group of a problem that at the beginning seemed to defy objective approach furnish one of the clearest illustrations of following a single line of interest year after year. These studies, which began with Seashore's interest in the components of musical ability (13), have steadily enlarged as to type of problem and as to technique used until they now constitute a valuable contribution to methodology in teaching music. The techniques used have been varied and furnish a good illustration of how scientific research in education and psychology should keep pace with technical developments in the physical sciences. The type of apparatus now common in the studies of music was almost unthought of in 1915. For example, the studies of voice, which are made possible through the photographing of the voice wave as projected by an oscillograph, enable the student of music to see the effects of various methods of teaching upon pitch, time, intensity, and tone pattern. Subjective judgment of these factors is now subject to verification by objective measurement and, without any attempt to transfer the laboratory to the classroom, various methods of teaching may be evaluated.

The same laboratory techniques that have been developed in the study of music are now being applied to a number of other types of educational problems. For example, schools of speech have found the analysis of voice records extremely useful in the training of their students. Schools for dealing with deaf children have found that, by the visual presentation of a sample voice wave on a revolving mirror, it is possible to secure a degree of control of the speaking voice by having the pupil talk into a second microphone that throws a parallel record beside the model wave on the mirror. Thus, by substituting a visual impression for the sound impression, which his deafness precludes, the deaf or semi-deaf child is able better to control his vocal response. Still further, the use of the technique of voice photography is now being applied in the study of phonetics and in the study of the pronunciation of foreign languages. There is every reason to believe that the technique can be extended to voice control with normal children and that methods of securing better vocalization in classes in oral English may

result from laboratory experiments with groups of subjects taught by different means but measured by the objective instruments of the laboratory. This type of laboratory work is thus an excellent illustration of how, over a long period of years, a persistent interest followed up by competent students has provided an expanding field of application and has contributed to many practical school problems that were not thought of at the outset as being at all connected with the type of laboratory research then initiated. It seems altogether probable, in other words, that the net result for education of Seashore's first interest in music will be a series of contributions in fields entirely outside the field of music, but which are of marked importance in the work of schools.

2. The Investigation of Reading

A second excellent illustration of the value of a persistent series of studies lies in the pursuit of laboratory investigations in reading. The early attempts to measure eye-movements in France, followed by the pioneer studies of Dodge and Judd in this country, have stimulated a whole series of similar investigations, carried on in numerous centers, that have now provided a literature that has had marked influence upon methodology in reading. At the present time there are some seventy substantial reports of a major sort dealing with eye-movements in reading. These studies have perhaps provided a better basis for the detailed understanding of the process of reading than has been furnished by any other single method. The contributions of the eye-movement studies rest primarily in the understanding they provide of the results of reading under various types of methods and at various stages of maturity. Studies of this kind are in the full sense of the term 'laboratory studies.' Educators should not be confused by the attempts of commercial concerns to sell such laboratory equipment in public schools as instruments of practical application. Applications of laboratory studies have not come by moving laboratories into school classrooms. Rather they have come by projecting the results of scientific studies carried on under rigid laboratory conditions to the problems of school classrooms. There are three types of situations that may be considered in reference to such laboratory experiments. (1) Scientific research for the discovering of new truths to be used by the schools is best carried on in laboratories where conditions of scientific experimentation may be imposed in the most rigid manner. (2) Laboratory apparatus may also be used to advantage in clinical research

in which specific difficulties in individual cases are to be identified and treated. However, in this type of research the advantage of laboratory apparatus depends entirely upon whether or not it is used by technically trained experts who are able to interpret the significance of the data secured by means of the apparatus. Without such technical training the use of elaborate apparatus may prove to be a hazard to education. (3) In the view of the writer, complicated apparatus has no legitimate place in the ordinary classroom. Classroom teachers should understand the results of scientific experimentation, but neither their technical preparation nor the time at their disposal warrants the use of elaborate apparatus. The distinction drawn in the early part of this paper between laboratory studies and classroom applications applies precisely to this type of situation. The functions of the classroom and the laboratory are not changed by the installation of expensive laboratory equipment in classrooms.

The laboratory studies of reading furnish a good illustration of the evolution of a method of investigation. The early studies are examples of a type of survey analysis that generally precedes the more critical testing of hypotheses in scientific experiments. The early studies of Dodge (14), Judd (15), and Dearborn (16) were of this type. They were varied in type and purpose and they served to clarify the meanings of the characteristics of eye-movements that they portrayed. These studies were followed by specific researches focused upon particular problems of methodology in reading (17) or of the effect of the materials (18) to be read.

One of the earliest major contributions of these studies was the distinction, pointed out clearly by 1916, that the process of oral reading and the process of silent reading are significantly different, and that the extensive reading demanded by adult experience is impossible to carry on with the analytical reading habits engendered by the method of oral reading. The sweeping reform of reading instruction from a program consisting entirely of the oral reading of one book per year to a program consisting, for the most part, of silent reading covering many books yearly shows how the clear understanding of one significant fact may have far-reaching outcomes. Subsequent studies of eye-movements have indicated how reading for different purposes is carried on by different processes and have given rise to an emphasis upon flexibility of reading habits that has been very much to the advantage of pupils in the schools.

Using eye-movement records as symptoms of the type of reading carried on, laboratory studies have been made of the reading of foreign languages as taught by different methods. The distinction between the deciphering habits that characterize the so-called 'reading' of many pupils in a class in Latin and the fusion of words into wider units of recognition as is common in the reading of the vernacular has made it clear that, if reading is to be an objective of the courses in Latin, changes in methodology are imperative.

As was the case in music, so also in the eye-movement studies of reading, the techniques have been found useful in other fields. Laboratory studies of this type have enlarged our understanding of the interpretation of symbols, as in reading shorthand, of the reading of music, of the process of looking at pictures, of the method by which the student follows the figures in reasoning in geometry, and in numerous other ways. In all these studies the essential contribution of the laboratory has come through the use of eye-movement records as *symptoms* of the mental processes carried on. Such studies have made possible a clearer understanding of how learning proceeds under different methods and materials of instruction.

3. The Investigation of Handwriting

A third illustration of how laboratory experiments have contributed to school work is furnished by the studies of handwriting, which were begun prior to 1915. The effectiveness of the experiments of Freeman (19) and others in analyzing both the handwriting movement and the resulting product under various conditions of movement has produced a change in methodology from the rigid insistence upon arm movement only, which characterized practice in the schools for years, to a type of movement better adapted to the human hand as an organ of skill. These studies furnish an excellent example of how laboratory results may be used to modify a procedure justified only by a *priori* inference.

4. Other Laboratory Experiments

The list of laboratory experiments carried on in education is too long for review here. The extent of this type of work may be indicated by a few random citations. Application of such techniques to speech disorder as illustrated by the work of Scripture (20), Travis (21), and Lord (22) indicates the type of valuable contributions made in this field. Studies of lateral dominance and its effect upon problems of

teaching reading, as illustrated in the work of Seltzer (23), deal with a fundamental problem the applications of which may prove to be much more ramifying than appears at present.

In the field of arithmetic some thirty clear-cut laboratory studies indicate the nature of possible contributions to that subject. An increasing number of laboratory studies is accumulating in the field of practical arts where analyses of skills are particularly susceptible to this method of attack.

A type of study somewhat different from those previously enumerated lies in the field of emotional behavior in which the effects of various degrees of emotional tension upon personality and learning are studied. Laboratory studies in this general field are not only concerned with school problems, such as the effect of examinations on nervous tension or the influence of school environment upon emotional balance, but are also very much concerned with the effect of situations outside the school upon the minds of school children. The implications of some of the Payne studies on the effects of motion pictures as summarized by Charters (24), of the numerous types of investigations mentioned by Ruckmick (25), as well as the general problems of behavior illustrated in the work of Darrow (26), show the possibilities of laboratory studies in this field. The work of the past generation has shown marked advances in the contributions of laboratory research to the learning processes carried on in schools. From present indications the contribution of the next generation to a similar analysis and understanding of behavior and emotional balance may be of a similar sort. Obviously, an increase in the understanding by teachers of such personality factors would be of very great value in directing learning.

IV. SUMMARY

The development of the laboratory method in education has passed through certain rather well-marked stages.

From 1878 to 1900 basic contributions were made to our understanding of individual differences and simple mental processes.

Between 1900 and 1915 the general pattern of laboratory work shifted in two directions, one type leading to a statistical analysis with a minimum of apparatus and concerned chiefly with the outcomes of learning, the other type leading to a development of laboratory procedures and apparatus adapted to an analysis of mental operations during the process of learning and aiming to provide a better understanding

of the way in which learning is carried on. Some extremely important techniques were developed during this period and were used in exploring the characteristics of learning.

Since 1915 there have been many specific applications of laboratory procedures to the work of the schools. Furthermore, there has been a continued expansion of laboratory analysis with the development of types of apparatus that were not available at an earlier date. In general, the field of interest has expanded from a study of the simple mental processes as exhibited in tests of memory, discrimination, reasoning, etc., to a study of more complex mental processes involved in the operations ordinarily carried on in schools, and finally to a study of conditions that are extraneous to the specific subjects studied but that have a marked effect upon the motivation of the learner and upon his general personality.

The laboratory method has shown a gradual growth unmarked by any wave of popular interest such as influenced the development of mental tests in 1918. Its primary contribution up to the present time has consisted in a better understanding of the nature of learning, a contribution reflected in numerous modifications in methodology.

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CHAPTER XXVI

GENERAL METHODS: CLASSROOM EXPERIMENTATION

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I. THE BEGINNING

The date of the beginning of 'classroom experimentation' depends upon the definition given to this term. If experimentation is thought of as merely a 'trying' of plans of education, instructional procedures, techniques, and the like, numerous instances can be cited from the history of education. For example, Vittorino da Feltre (1378-1446) 'tried' certain innovations in his school, the *Casa Giocosa* at Mantua. Johann Heinrich Pestalozzi (1746-1827) 'tried' educational theories in his schools at Stanz, Burgdorf, and Yverdon. Johann Friederich Herbart (1776-1841) was a firm believer in the value of experimental procedure and inaugurated a practice school along with his pedagogical seminar at the University of Königsberg. The evaluation of pedagogical theory by trial in practice was the aim of several pioneer experimental schools in the United States. Among the most notable of these were the Oswego State Normal and Training School, with its model school for observation, established by Edward A. Sheldon in 1861; the experimental school inaugurated by Francis W. Parker when he assumed the principalship of the Cook County Normal School in 1883; and the Laboratory School at the University of Chicago, established by John Dewey in 1896.

If the definition is restricted to what is now commonly designated as 'controlled experimentation,' the beginning can be traced back to the last decade of the nineteenth century. In a controlled experiment there is an effect (dependent variable), typically the mean achievement of a group within a specified area, which is the resultant of several

causes or contributing factors. The problem is to ascertain the change in this effect resulting from a planned change in one of the contributing influences (experimental factor), all of the other causes (non-experimental factors) being held at a specified status or otherwise controlled. For example, if the experimental factor is the sequence of textbook study and laboratory work in chemistry, the planned change is from 'textbook study of a topic followed by laboratory work' to 'laboratory work followed by textbook study.' In order to obtain a measure of the effect of this change upon the average student achievement, it is necessary to have two groups, the one being instructed by the textbook-laboratory sequence and the other by the laboratory-textbook sequence. If the other factors influencing the achievement are equivalent for the two groups, the difference between the average gains (experimental difference) will be the effect of the specified change.

Rice's studies¹ initiated in 1895 were comparative surveys and hence cannot be regarded as controlled experiments, but they do exhibit some of the characteristics of this type of research and hence may be referred to in this connection as indicating an attempt in the direction of controlled experimentation. During the school year of 1897-1898 Cornman² carried on a controlled experiment in which incidental instruction in spelling was compared with systematic instruction in this subject. No evidence is given concerning the equivalence of the pupils in the two experimental schools and those in the "other schools," but it is asserted that the "other schools" were representative. No initial test was given and the final test was the "term examination," which was prepared in the office of the superintendent of schools and given throughout the city of Philadelphia. However, in spite of these crudities the study may be designated as a controlled experiment.

II. STATUS OF CLASSROOM EXPERIMENTATION IN 1900-1910

Although few controlled classroom experiments were reported during the decade, 1900 to 1910, there was a growing interest in this type of educational research. In the first number of the *Journal of Educational*

¹J. M. Rice. *Scientific Management in Education*. (Hinds, Noble, and Eldridge: New York, 1912) See especially Chapters V-X, which were originally published in the *Forum*.

²O. P. Cornman. *Spelling in the Elementary School, an Experimental and Statistical Investigation*. Pp. 59-60. (Ginn and Company: Boston, 1902)

Psychology, January, 1910, the editorial announcement included the following statement:

We believe that the time is ripe for the study of schoolroom problems in the schoolroom itself, and by the use of the experimental method. Educational practice is still very largely based upon opinion and hypothesis and thus will it continue until competent workers in large numbers are enlisted in the application of the experimental method to educational problems. Little more than a beginning has been made in this important movement.

III. THE STATUS IN 1923: McCALL'S FORMULATION

Controlled classroom experimentation requires instruments for measuring pupil traits and achievement, and consequently the development of experimental research was slow until group tests became available. The construction of tests during the years immediately following 1910 contributed materially to the development of experimental research but the number of such studies was not large until after 1920. In the first chapter of *How to Experiment in Education*, published in 1923, McCall stated, "everywhere there are evidences of an increasing tendency to evaluate educational procedures experimentally," and the publication of this volume, which provided detailed instructions, accelerated this tendency.

McCall's text furnishes an indication of the status of the techniques of controlled experimentation in 1923. Three methods are described: (1) one-group method, (2) equivalent group method, (3) rotation method, which is designated as "a unique combination of two or more one-group experiments." The one-group method does not provide for a control group and, hence, studies of this type represent a 'trying' of some plan or technique. The essential difference between them and the 'experiments' referred to in the first paragraph of this chapter is that objective tests were now employed for measuring pupil achievement. Hence, McCall's 'one-group method' should not be thought of as representing a type of controlled experimentation. The equivalent group method is the typical plan of controlled experimentation. Although the "technique of pairing pupils" is treated, groups are considered equivalent when their means and variabilities are equal.

1. The 'Rotation Method'

There are several variations of the rotation method, but the principle involved is illustrated in a study organized as follows: Teacher

A instructs a group for three months employing Method X; Teacher B instructs an equivalent group for three months employing Method Y. Then the two teachers are 'rotated'; A instructs the second group employing Method Y while B instructs the first group employing Method X for a second period of three months. Since each group will have been instructed by both teachers, the rotation method was considered to provide for neutralizing any differences in teaching ability and personality. A modification of the plan provides for neutralizing differences in the two groups of pupils.

McCall outlined in detail the steps in the statistical treatment of the data. In each case the final result is an experimental coefficient ($EC = \frac{D}{2.78\sigma_D}$). Although it is pointed out that the statistical procedure assumes that the population from which the data were obtained is a random sample of the larger population or universe for which interpretation is desired, the reader is told that "an experimental coefficient of 1.0 means that we can be *practically certain* that the true D is somewhere above zero" (p. 154). The mechanized interpretation suggested by this statement is characteristic of McCall's treatment. The procedure of experimentation is made to appear simple by being reduced to a routine that is described in terms of formulas.

2. The 'Equivalent-Group Method'

During the period since 1923 the equivalent group method has become the dominant experimental procedure. The one-group method is generally regarded as inadequate and the rotation method is seldom employed. It has become customary to obtain equivalent groups by pairing pupils.³ Both Lindquist and Wilks⁴ have proposed a more appropriate formula for calculating the probable error of a difference when the groups are matched.

IV. DEVELOPMENT SINCE 1923

Developments in the construction of educational tests have also contributed to the improvement of controlled experimentation, and a

³ M. D. Engelhart. "Techniques used in securing equivalent groups." *Journal of Educational Research*, 22: 1930, 102.

⁴ E. F. Lindquist. "The significance of a difference between matched groups." *Journal of Educational Psychology*, 22: 1931, 197-204.

S. S. Wilks. "The standard error of the means of matched samples." *Journal of Educational Psychology*, 22: 1931, 205-208.

further contributing influence has been the critical discussion of experimental procedure.⁵ Along with the refinements in techniques, there has been a growing tendency to recognize that experimental research, especially the interpretation of the findings, cannot be reduced to a mechanized routine.

The number of controlled experiments reported in educational periodicals, bulletins, and monographs is large; others are recorded in unpublished manuscripts. The two lists of studies of methods of teaching high-school subjects in the *Review of Educational Research*⁶ include more than nine hundred references. It is probably a conservative estimate to say that half of these references are accounts of controlled experiments. The number of experimental studies of methods of teaching at the elementary-school level is greater. In addition, there are experimental studies of class size, ability grouping, supervisory procedures, motion pictures, and other topics.

V. DISAPPOINTING LIMITATIONS OF CONTROLLED EXPERIMENTATION

The direct contributions from controlled experimentation have been disappointing. "The controlled experiment has not fulfilled the expectations of its proponents a decade ago." In its general outline the procedure of the controlled experiment is simple and easily understood. It is recognized as the method of science, and one is naturally encouraged to expect that the solution of educational problems may be attained by setting up appropriate controlled experiments. But when the controlled experiments relative to a problem are critically examined, it is usually apparent that the question studied has not been answered conclusively.

⁵W. A. Brownell. "Some neglected safeguards in control-group experimentation." *Journal of Educational Research*, 27: 1933, 98-107.

Walter S. Monroe and Max D. Engelhart. "Experimental Research in Education." *University of Illinois Bulletin*, Vol. 27, No. 32, (Bureau of Educational Research Bulletin, No. 48, 1930. 105 pp.)

Walter S. Monroe and Max D. Engelhart. "A Critical Summary of Research Relating to the Teaching of Arithmetic." *University of Illinois Bulletin*, Vol. 29, No. 5. (Bureau of Educational Research Bulletin No. 58, 1931. Pp. 98-107.)

Walter S. Monroe and Max D. Engelhart. *The Scientific Study of Educational Problems*. Chapter X. (Macmillan Company: New York, 1936)

⁶February, 1932, and December, 1934.

⁷H. R. Douglass. "Scientific investigation of instructional problems." *Journal of Educational Research*, 29: 1935, 135.

1. Example from Ability Grouping

The following statement relative to the research on ability grouping probably could be applied to almost any problem that has been subjected to extensive experimental study:

This analysis of the thirteen most significant experimental studies in this field has demonstrated the haphazard condition in which research upon the problem of class-grouping has remained for ten years. Among all these attempts to answer this question as to the effectiveness of homogeneous grouping in terms of gains in scholastic attainments, the studies of Billett and of Barthelmess and Boyer stand out for their care of planning and caution in drawing conclusions from their data. Yet these writers confessedly leave problems unsolved, even in this relatively limited sphere of scholastic attainments. Moreover, while the excellence of their techniques would incline one to accept their findings in favour of ability grouping, these findings have been contradicted by those of other studies which, while of unequal experimental significance, cannot be altogether ignored.⁸

2. Example from Arithmetic

A critical summary of scientific studies relating to the teaching of arithmetic,⁹ published in 1931, is probably indicative of the contributions from controlled experimentation in the field of methods of teaching. One hundred twenty-eight studies, most of which are controlled experiments, were classified under forty-eight problems. In the case of thirty-six of these problems, the evidence was considered lacking in dependability or inadequate as a basis for generalization. In three other cases the dependability of the evidence was doubtful. The nine dependable conclusions are epitomized in the following statement:

Systematic drill increases achievement in arithmetical calculation and is most effective when the exercises include all number combinations and the amount of practice on the several combinations is proportional to their difficulty. For the maintenance of skill, material of a mixed nature is relatively more effective than drill material in which separate practice is provided for addition, subtraction, multiplication, and division. Diagnosis and remedial instruction are highly effective. Typical pupil responses to verbal problems

⁸ Harold S. Wyndham. *Ability Grouping*. P. 156. (Melbourne University Press: Melbourne, 1934)

⁹ Walter S. Monroe and Max D. Engelhart. "A Critical Summary of Research Relating to the Teaching of Arithmetic." *University of Illinois Bulletin*, Vol. 29, No. 5. (Bureau of Educational Research Bulletin No. 58. University of Illinois: Urbana, 1931. 115 pp.)

are usually characterized by a lack of critical reflective thinking. Systematic training in finding the facts pertinent to a problem, in deciding the processes to be used, and in finding the answers in round numbers is an effective method of teaching verbal problems in arithmetic. Reading ability is a factor in arithmetical achievement. Informing students with respect to their status or progress is an effective means of stimulating learning activity.

If the research in this field since 1930 were similarly evaluated, it is likely that some additions would be made to the list of generalizations, but the number of questions for which the findings are unsatisfactory as bases for generalization would doubtless be conspicuously large. It seems fair to assert that, when the amount of research relating to the teaching of arithmetic is considered, the contributions do not appear comparable with the investment in research. A similar assertion may be made with reference to the teaching of other school subjects.

3. Nature of the Limitations

To the question "Why?" it is easy to point out numerous faults of procedure. Frequently there is inadequate delimitation and specification of the experimental factor; in most cases there is at least doubt concerning adequate control of non-experimental factors; in many cases the measurement of the dependent variable is not satisfactory.

Delimitation of the experimental factor is essential for precise interpretation of the findings. If the experimental factor is complex, the explanation of the difference between mean gains will be uncertain. Unfortunately, many of the practical problems do involve a complex experimental factor. It has been asserted that it is "exceedingly difficult to raise an issue in the teaching process which is sufficiently definite."¹⁰ If an attempt is made to restrict the experimental factor to a single influence, the relation between it and certain non-experimental factors may create a situation that is pedagogically unsound. For example, in studies of class size, sound practice dictates that the method of instruction and probably other factors be adjusted to the size of class. Such adjustment, however, makes the experimental factor consist of class size plus methods of teaching and possibly other factors. Such a complex experimental factor may well seem unsatisfactory and in that case the experimenter faces an *impasse*; it is impossible to specify

¹⁰ H. C. Morrison. "Major lines of experimentation in the laboratory schools." *Supplementary Educational Monographs*, No. 24. P. 25. (University of Chicago Press: Chicago, 1934)

a sufficiently restricted experimental factor and at the same time conform to sound educational practice.

There is another difficulty: although the control of non-experimental factors is the distinctive characteristic of controlled experimentation, we do not yet have any authoritative list of the factors to be controlled in experimental situations.¹¹ In the absence of dependable information concerning the factors to be controlled in a given situation, inadequate control is naturally to be expected. Furthermore, the control of some factors that are probably important in certain situations is difficult. For example, the zeal and enthusiasm with which a teacher applies an instructional procedure is probably a potent factor in the determination of student achievement, but the control of this factor is difficult. If its control is attempted, an artificial teaching situation may be created.

When an experimental problem is adequately defined, the dependent variable is specified. Frequently this variable is a segment of student achievement. When the specified achievement consists of skills or factual information, the measurement of the dependent variable does not involve serious difficulties. But more frequently the dependent variable specifies, or at least implies, the inclusion of abilities for which satisfactory measuring instruments have not yet been developed.

4. The Possibility of Generalization

Although many experimenters refrain from generalizing when reporting their studies, the motivation for such research is usually the possibility of generalization. An investigator hopes that the findings from the population studied may provide a basis for a dependable statement of what may be expected in other populations. For example, suppose it is found that a change from *A* to *B* in the experimental factor within a given population results in an experimental difference *D*. The experimenter hopes that he may be able to specify the likelihood that a change from *A* to *B* may be expected to produce a similar difference in another population.

The possibility of generalizing depends upon the possibility of specifying this other population in terms of its essential characteristics.

¹¹A suggested list is given in W. S. Monroe and M. D. Engelhart. "Experimental Research in Education." *Loc. cit.* Chapter II.

See also W. S. Monroe and M. D. Engelhart. *The Scientific Study of Educational Problems. Loc. cit.*, pp. 278-289.

Theoretically, this may appear relatively easy, but an attempt to generalize will reveal the difficulty. Suppose *A* and *B* are two comparable methods of teaching and that the experimental difference is in favor of Method *B*. If it is assumed that the non-experimental factors have been adequately controlled and the measurement of the dependent variable was satisfactory, there still remains the question of the essential characteristics of the larger population in which similar results may be expected. These essential characteristics includes traits of teachers, traits of pupils, teacher-pupil relationships, characteristics of the school and its curriculum, and possibly characteristics of the community.

VI. THE OUTLOOK

The future of classroom experimentation is difficult to predict. The attention being directed to the techniques of this type of educational research will doubtless result in further refinements of procedure. Critical summaries of reported studies will direct attention to the needs for further research and more adequate definition of problems will reduce the number of ill-advised experiments. There appears to be justification for expecting increased direct contributions, but it is not unlikely that the by-products of increased understandings of the problems studied may be equally significant.

CHAPTER XXVII

GENERAL METHODS: CASE STUDY

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Intensive study of individual children has furnished the basis for philosophies of education, for generalizations on growth and behavior, and for guidance practices.

From the point of view of prediction and control of the growth and the behavior of an *individual*, the case study is the most scientific method now known. Reasonably large and representative samples of the population from which data are gathered in a definite manner are recognized as necessary conditions for the extension of generalizations to *groups*. Viewing the organism as a whole, the individual is the unique representative of a statistical class involving a complex of variables. A dynamic concept of development recognizes that variations in the applicability of generalizations occur because of laws of balance and organization within the individual.

The techniques and data employed in a case study vary according to the purposes and occasion. Thus the need for comprehensiveness is less when a teacher attempts to locate the process by which an otherwise able child regularly secures an incorrect solution in arithmetic than when a group in a clinic attempts to understand an undesirable trend in the personality of a child and to make recommendations for its elimination. If the problem is guidance into a vocation, the data are somewhat different than if the problem is one of direction into further educational opportunity. Much or little evidence may be required, depending upon the nature of the problem and the seriousness of the consequences that may flow from the decision.¹

¹ Illustrations of the case method applied to educational disabilities may be found in (1) Harry J. Baker. *Educational Disability and Case Studies in Remedial Teaching*. (The Public School Publishing Company: Bloomington, Illinois, 1929. 172 pp.) and (2) Marion Monroe. *Children Who Cannot Read*. (The University of Chicago Press: Chicago, 1932. 205 pp.)

The person engaged in case study realizes that every type of behavior has a past, a present, and a future. If one wishes to modify the future, he does so in part by understanding the dynamics of forces operative in the past and present. A complete account requires some information concerning hereditary factors as revealed in the grandparents, parents, and collaterals. A history of health and disease, and of traumatic emotional and social episodes, is standard practice. An adequate case study usually includes a rather comprehensive appraisal of the child's present status. The measures of status commonly include a physical examination, mental tests, measures of educational achievement, diagnostic tests, and examinations of special interests, attitudes, and aptitudes.

A major instrument in case-study technique is the interview. The interview may be with the individual directly concerned or with a person bearing some relationship to him. In the case of young children, the interview is sometimes implemented with plastic and construction materials, paint, or toys. Many excellent discussions of factual and treatment interviews are now available in the periodical literature and in systematic works.²

The ideal clinical study utilizes the technical refinements growing out of every field of investigation. With all the evidence at hand, decisions, recommendations, and treatment are based upon a synthesis of the material in harmony with available knowledge. In cases of uncertainty, treatment hypotheses are tentatively held to be confirmed or disproved by subsequent events. The formula for clinical practice is simple in broad outline, but enormously complex and technical in detail. The task in case work is to change the child who presents the problem, change the environment, or change both. The change of the child through personal or milieu therapy may require a variety of special knowledge and skills.

In some instances, a particular worker in a definite specialty or position is the responsible agent in case-study procedure. Depending upon the problem, the person may be counselor, physician, minister, nurse, psychologist, teacher, social worker, psychiatrist, personnel officer, speech specialist, principal, dean, or registrar. It is probable that every practitioner in the field of human relations can use case methods with profit.

² Methods of interviewing in all fields have been summarized by Walter V. Bingham and Bruce V. Moore. *How to Interview*. (Harper and Brothers: New York, 1931. 320 pp.)

Since case studies, regardless of the point of contact with the individual, always present ramifications in every direction, successful procedure rests heavily on the breadth and depth of insight of the person or persons conducting them. Several administrative plans have been devised for the pooling of the data and services of persons with essential knowledge and skills. In an attack upon behavior problems of children, child-guidance clinics find it desirable to integrate the contributions of psychiatrists, psychologists, physicians, and psychiatric social workers with the resources of schools and community agencies.³ Similar provisions for integration have been made in some of the child-development research centers.

While case-study procedure emphasizes a qualitative synthesis of data, the method has also been utilized in quantitative research studies. Ackerson,⁴ for example, has made a statistical analysis of factors occurring in the clinical records of the Institute for Juvenile Research. The frequency and relationship of factors constitute a fruitful field of inquiry. In still other instances, quantitative investigations have been supplemented by case studies. This is illustrated in a recent study of twins.⁵ Statistical findings are given human interest and a qualitative matrix by the detailed presentation of the resemblances and histories of the twins studied. The reader who is untrained in statistical methods is also permitted to become more intimately acquainted with the material by the alternative mode of presentation.

Brief mention should be made of some of the deficiencies in case-study practices. A number of criticisms are concerned with the difficulty of securing valid and reliable historical material concerning a case. Other objections are raised to the 'proliferation' of diagnostic and treatment theories without the verifications demanded by the best standards of scientific practice. There is only a meager amount of carefully controlled evidence on the effectiveness of changes brought about by case study and treatment approaches.

A more adequate technique of case study is now emerging in well-

³ The best illustrations of the coördinated approach may be found in Mary B. Sayles. *Child Guidance Cases*. (The Commonwealth Fund: New York, 1932. 584 pp.)

⁴ Luton Ackerson. *Children's Behavior Problems*. (The University of Chicago Press: Chicago, 1931. 268 pp.)

⁵ Horatio H. Newman, Frank N. Freeman, and Karl J. Holzinger. *Twins: A Study of Heredity and Environment*. (The University of Chicago Press: Chicago, 1937. 369 pp.)

equipped laboratory schools. In these schools the history of the child is written as he goes, so that, if he becomes the object of special study, the persons concerned may proceed with recorded data of high objectivity.⁶ Such a record at times acts as a corrective on the misinterpretation of causal influences. Thus, the assumption that reading disability has caused emotional disorder is questioned when the record reveals that the emotional problem was present before the child had any opportunity or occasion for reading. The longitudinal study of the individual is contributing new knowledge on the growth, general behavior, and achievement of the organism viewed as a whole.

The case study in relation to education is a method with a respectable past and a promising future.

⁶ The same trend in public education is represented in the increased advocacy and use of cumulative personnel records. See for example: *Cumulative Personnel Records. Elementary and Secondary Schools*. Harrisburg, 1933. (Commonwealth of Pennsylvania, Department of Public Instruction, Bulletin 81)

CHAPTER XXVIII

GENERAL METHODS: EDUCATIONAL DIAGNOSIS

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The most direct way in which to evaluate the effectiveness of any educational program is to observe the behavior of its product in the affairs of daily life. When this behavior is inefficient, unwholesome, or not in accord with accepted social standards, the school must examine its own program, the personality of the learner, and elements in the environment both in and out of school, to locate the causes of the unfavorable condition. When once the causes have been determined, the necessary corrective and remedial measures can be taken. In order to carry out this program successfully, the school must in many instances seek the coöperation of other social agencies that deal with elements in the environment over which the school has little direct control.

I. THE FUNCTION OF DIAGNOSIS IN EDUCATION

The scientific study of the nature and causes of learning difficulties and of means of preventing and correcting them has contributed a body of information on the basis of which many schools, unfortunately not all, have modified their instructional problems. However, in spite of administrative readjustments of various kinds, modifications of the curriculum, and improved methods and materials of instruction, there still are many children who encounter serious learning difficulties, and often become maladjusted educationally, socially, and emotionally. Because of the subtle, complex nature of the contributing factors, it is frequently necessary to bring these cases to the attention of experts for study and diagnosis.

Educational diagnosis is concerned with the more or less precise determination of the specific nature of maladjustment or deficiency in learning, the discovery of the causes of this condition in so far as this

is possible, and the subsequent taking of steps to bring about a change that will most likely lead to an improvement. Diagnosis is essential for the rational treatment of an abnormal or unsatisfactory condition, for, without diagnosis, treatment is empirical or merely symptomatic and not curative. Diagnosis should lead to a forecast of the probable results of the condition. It must be admitted that prognosis of educational deficiencies cannot be done with any degree of assurance in some cases because of our present lack of detailed knowledge as to the nature and development of various types of defects.

The necessity of defining with precision the specific nature of a learning deficiency has led to the development of tests of various kinds that serve this purpose. The earlier tests were of a general type that gave only a rough index of ability in a major field of the curriculum, such as spelling or arithmetic. The results were of such a general character that it was not possible to determine with any degree of exactness the specific nature and degree of the deficiency. As a consequence, tests more analytical in character were gradually developed. These have made it possible to locate in a definite way the specific element of a major ability in which an apparent deficiency exists.

II. THE RESOLUTION OF MAJOR ABILITIES INTO SPECIFIC SKILLS

One of the important findings of these studies is evidence that a major ability—for example, reading—consists of a considerable number of specific skills, or elements, all of which must be developed to insure efficient performance. Weakness in one element may cause a general deficiency. This fact has been of great significance in educational diagnosis, since it has led to the devising of tests of specific abilities and skills that have enabled the teacher to determine and to describe the nature of a deficiency much more precisely. The greatest progress in this respect has been made in the fields of arithmetic and reading. In recent years much progress has also been made in developing analytical tests in some of the fields of high-school and college instruction. An excellent example is the work being done at such universities as Minnesota, Chicago, and Ohio, to devise tests to determine whether the recognized objectives of various fields of study are being achieved. One of the most promising fields of future research is the development of analytical tests of some of the less definite outcomes of learning, such as attitudes, appreciations, character traits, and methods of thinking, for which the school is more and more coming to be held responsible.

III. TYPICAL CAUSES OR FACTORS ASSOCIATED WITH LEARNING DIFFICULTIES

When a deficiency has been located, its cause must be determined, so that steps may be taken to obviate or correct the condition. Intensive research on the causes of learning difficulty extends back a half century or more. In the beginning this work was greatly handicapped by the lack of precise means of measurement and an inadequate understanding of the learning process itself. During this period many different points of view on the causes of learning difficulty appeared and various lines of approach were used, some of them more prominent than others. Highly significant findings have resulted. In general, factors that are now known to be more or less directly associated with difficulties and maladjustments in learning may be grouped under the five heads (1) physical or physiological handicaps, (2) mental or psychological deficiencies, (3) ineffective pedagogical procedure and inadequacies of instruction, (4) emotional or social maladjustments, and (5) unfavorable environmental conditions.¹ We have learned to recognize many symptoms of these factors and thus to arrive more quickly at a diagnosis of an unsatisfactory condition.

IV. CURRENT APPROACHES TO DIAGNOSIS

1. An Example from Reading

Gates² recently summarized the findings of studies dealing with the causes of reading deficiencies in a statement that will illustrate the current approaches to the problem of diagnosis in various fields of the curriculum. He listed as factors associated with reading deficiency (1) defective bodily organs, such as eyes, ears, speech organs, etc.; (2) certain unusual organic characteristics, such as inadequate lateral dominance, (3) deficient psychological processes, such as poor perception, (4) constitutional immaturity, as seen in lack of motor control, (5) educational immaturity, due to limited social experience, (6) unfortunate forms of motivation, such as negativistic attitudes, and (7) inadequate reading techniques caused by ineffective teaching or the unfortunate accidents of trial-and-error learning, or both. It is significant that Gates did not include the intelligence level of the learner in his list

¹For a detailed discussion of these factors, the reader is referred to "Educational Diagnosis," the *Thirty-Fourth Yearbook* of this Society.

²Arthur I. Gates. *The Improvement of Reading*. (The Macmillan Co.: New York, rev. ed., 1935)

of causes of reading deficiency. He contended that "despite the fact that physical, mental, and emotional obstacles are numerous and serious, it is believed that most children of intelligence quotients above 70 may be taught to read if optimum methods are employed." This point of view should serve as a challenge to those interested in improving instruction in other fields. It indicates the importance of continued research on the improvement of methods and materials of instruction in all fields of the curriculum. It may be that our easy explanations of reasons for learning deficiency have led to a complacent acceptance of the condition rather than to an active attack on the elements contributing to it. It seems evident that under more efficient instruction and guidance many of the difficulties that now arise will not develop. Recent research has indicated the necessity of adapting not only methods but also materials of instruction to both the mental level of the learner and his level of development or maturity. Furthermore, the necessity of adapting instruction to the specific needs of the learner has also been clearly demonstrated. It is evident that instruction can proceed intelligently only if the teacher adapts the program to the facts revealed by a comprehensive picture of the characteristics, abilities, and aptitude of each individual and of the nature of the environment in which he lives.

2. Adaptation as a Compensation to Defect

One difficulty in attempting to determine the causes of a deficiency grows out of the fact that a particular specific defect, such as muscular imbalance of the eye, is not invariably associated with a weakness; for example, in reading. It has been found that in many instances an apparently efficient reader who has a certain visual defect has made some sort of adaptation of the physiological mechanism, which adaptation has so compensated for the defect that it no longer interferes seriously with learning. This adjustment may have been due to the influence of such factors as the strong motivation of a desire to learn to read, a well-adjusted instructional program, or of corrective measures, like wearing glasses. The recognition of the fact that a given condition is not invariably associated with a particular defect or vice versa, led to the use of the expression, "factors associated with learning difficulties," instead of "causes of learning difficulties" in the Society's yearbook on *Educational Diagnosis*. The discovery of a particular defect should, therefore, not lead to a hasty diagnosis of the cause of a weakness, since other factors may be involved.

3. Multiple Factors

Research has also made it quite clear that ordinarily a given deficiency is not due to a single factor (cause) but rather to a combination of factors. For example, in the case of a deficiency in arithmetic one may find a combination of such possible contributory factors as weakness of an essential basic skill, inadequacies of materials of instruction, a physiological handicap, a faulty attitude, and lack of experiential background, any or all of which may have contributed to the weakness. The point is that the cause of a learning deficiency is ordinarily not as specific as the cause of a physical illness, such as typhoid or diphtheria, and hence is more difficult to determine. This point has been emphasized by those who maintain that it is necessary to deal with all aspects of personality to arrive at a satisfactory diagnosis. The more complex the condition to be diagnosed, the wider the area of the factors that must be investigated. Thus, the diagnosis of a weakness in some arithmetic process ordinarily is much easier to make than a diagnosis of a tendency toward delinquency. The factors involved in the former are largely limited to conditions over which the school has some control, and which can easily be analyzed, while the latter may be due primarily to the effects of environmental factors, difficult to isolate, over which the school has little control.

V. METHODS OF DIAGNOSIS

To determine the nature of a deficiency numerous procedures have been devised. They range in merit from the refined, precise techniques of the psychological laboratory to the informal, unsystematic observation of behavior under uncontrolled conditions on the playground and elsewhere. A convenient way of classifying available methods of detailed diagnosis is as follows:

1. *Interview*, with associates or with the individual concerned, to secure information not obtained by available tests or to study the history of the case. The use of the questionnaire is included in this classification.

2. *Measurement*, as done by detailed, analytical tests of the kind previously described, and by tests of mental ability, readiness tests, prognostic tests, and the like.

3. *Analysis of written work*, as in the study of the kinds of errors made in spelling and arithmetic, the determination of specific defects—for example, in handwriting—or the rating of compositions by comparison with standard specimens.

4. *Analysis of oral responses*, as in the study of errors made by pupils in reading aloud and in oral speech, or of the mental processes indicated when pupils work examples in arithmetic aloud.

5. *Analysis of behavior*, in general as by means of behavior rating scales and check lists, or under controlled conditions, as in analyzing study habits or skill in the use of instruments.

6. *Laboratory or clinical procedures*, such as require the use of special devices that make possible the precise description of the physical, mental, or emotional characteristics of the individual.

Education now uses freely and adapts to its needs the techniques that have been devised by related sciences, such as biology, medicine, psychology, sociology, and psychiatry. The fact that learning has a biological basis has made it necessary to study by suitable procedures the human mechanism itself to discover possible conditions contributing to a deficiency. The testing and analytical procedures developed in the psychiatric and psychological laboratories have contributed much to the application of similar techniques to the study of the mental processes involved in learning. The necessity of considering the nature of the environment and its effects on the learner has led the school to use the techniques devised by sociologists and social workers to analyze social conditions that may be contributing to maladjustment or learning deficiency. In general, the modern school now uses the methods of any related field of science that will assist in the solution of its problems.

Scientific workers are constantly endeavoring to improve these methods of diagnosis and to devise more effective methods of analysis. In general, the methods just listed require the observation or testing of an individual, the securing of a record of the behavior in test situations, and the evaluation of the behavior. The procedures involved are becoming increasingly scientific and systematic. Observations have become specific in that the trained observer looks for things that have been so carefully defined that almost nothing is left to his personal judgment. Where systematic analysis is essential, the length of the observation periods and the circumstances of the whole program are carefully planned in advance. In so far as is possible, the record of the observation is expressed in quantitative form and is made in full detail. Many excellent record forms have been devised for use by clinical workers. Considerable attention has also been given to the use of various means of getting as complete records of observations as possible; for example, by means of stenographic and dictaphone records of re-

sponses and by motion pictures (talkies) of situations, which make it possible to study behavior repeatedly and from different angles. In many institutions special training in techniques of observation and methods of systematic diagnosis is provided.

Recently special attention has been given to the validity of observational techniques and to the reliability of the results of the observation. These studies have raised vital questions as to the adequacy of many widely used diagnostic devices, because they have demonstrated considerable variability in the level and quality of human responses under different conditions and the lack of persistence in the errors made by an individual. It is becoming very evident that the diagnosis of learning difficulty is a much more complicated process than the diagnosis of physical ailments.

VI. THE EFFECT OF DIAGNOSIS IN IMPROVING INSTRUCTION

The application of these various diagnostic techniques has yielded a wealth of information of great significance to those concerned with the improvement of instruction. Systematic studies have revealed the relative difficulty of the elements being presented in the curriculum and have aided in their proper placement. The development of valid diagnostic tests has grown out of the systematic analysis of the elements involved in the various subjects and processes, and of the outcomes that are desired. This detailed analysis has had a marked influence on the improvement of instructional materials, since it has led to greater care in their construction. The study of the kinds of errors and deficiencies present in the work of pupils and the knowledge of the faulty methods of work that many of them employ has led to the development of more effective methods of instruction and to the provision of special kinds of learning exercises that prevent the incidence of inefficient, round-about methods of work. Diagnostic techniques are being more and more incorporated as essential elements of good teaching procedures. Illustrations are the use of pretests in spelling and the use of various kinds of tests in the Morrison plan of teaching.

To supplement the kind of diagnostic work that can be done by the classroom teachers, many schools now provide educational clinics of various kinds that deal with cases too difficult for the teacher to work with effectively, such as serious behavior problems and cases presenting unusual learning difficulties in such subjects as reading or language. In these clinics we find specialists who can bring to bear on these cases the

contributions of the various sciences that may help to diagnose the condition and to determine the necessary corrective and remedial measures. The value of such services has been repeatedly demonstrated.

It has been well said that medicine made its most rapid progress "when doctors began to count." There can be no question that education has made its greatest strides forward since attempts have been made to apply scientific techniques to the study of learning and the factors that condition it. Greatest progress has undoubtedly been made in the field of diagnosis, although here much remains to be done. It is essential that we now undertake more systematic studies of means of obviating causes of deficiency, especially of obviating the causes underlying many of the common difficulties that now arise because of our failure to employ effective means of instruction, control, and guidance.

CHAPTER XXIX

THE SPECIFIC TECHNIQUES OF INVESTIGATION: EXAMINING AND TESTING ACQUIRED KNOWLEDGE, SKILL, AND ABILITY

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Forty-one years ago the achievement-testing movement had its inception in the work in spelling of J. M. Rice. Since that time millions of achievement tests have been sold, millions of children have been tested, and more than one hundred books have been written describing achievement tests and their uses. That the achievement-testing movement has made tremendous growth is obvious. To appraise the significance and the nature of its influence upon American education requires a consideration of the techniques used by achievement-testers and the ideas that their work has injected into our educational program.

When the achievement-testing movement is considered in terms of its development and influence, two rather clearly defined periods are evident. The direction of activity during the first thirty years—that is, between 1897 and 1927—represented an emphasis somewhat different from the direction of activity during the past eleven years.

I. INFLUENCES DOMINATING THE FIRST THIRTY YEARS OF ACHIEVEMENT-TESTING

During the first thirty years of the achievement-testing movement three avenues of influence were largely dominant.

1. The Standardization of Test Items and Conditions

The effectiveness of a comparison of results obtained by using the same test in several grades, in various schools, and in different cities was shown by the spelling investigation of Rice and by the pioneer survey at Cleveland. The result of this influence was to emphasize

standardization of test items and testing conditions. Since spelling and arithmetic were the first subjects to be used in such tests, the problem of validity—that is, whether the tests really measured the desirable outcomes of education—was concealed by the very nature of the subject matter. The assumption that a pupil's ability to spell a given list of words was a valid test of his spelling ability was accepted without extended consideration of the psychological nature of the outcomes to be expected, while his response to the request that he perform indicated arithmetic operations upon a given list of numerical exercises was thought to be a valid test of his ability in the fundamental operations of arithmetic. Much study was given to such problems as the words to be used in the spelling list and to the numerical exercises to be included in the arithmetic test, but the types of mental reaction that should be expected of pupils in a valid test of these subjects were rarely considered.

2. Efforts to Extend to Education the Conceptions of Measurement Current in the Physical Sciences

A second major influence in the early development of educational measurement was the conception of measurement that dominated the thinking of physical scientists during the nineteenth century. As tests were developing, the possibility for using them as measuring scales began to be considered by psychologists and students of education. They began to conceive of the possibility of making education an exact science. This led to their giving attention to the concepts held by the exact scientists and determining to what extent these concepts could be applied to educational testing. The study of scaling methods and of the units in which educational measures could be expressed naturally followed. To express in tangible units the intangible elements with which educational testers were dealing necessitated the formulation of certain assumptions upon which these intangibles might be translated into comparatively exact units of measurement.

One assumption frequently used was that when persons attempt to judge the relative merit, quality, or difficulty of the pupils' work differences in merit, quality, or difficulty that are noted by an equal proportion of judges are equal. Thus, for example, by having a large group of judges estimate the relative quality of specimens of hand writing or of English composition it became possible to place these samples of hand writing or of English composition on a scale expressed in definite units

if one accepted this assumption that differences in quality noted by the same proportion of judges represent equal differences in quality. A variation of this method less frequently used was the method of paired comparisons.

Other assumptions were also developed to facilitate scaling. Thus it was frequently assumed that the particular quality being appraised was normally distributed among the population of pupils. By using this assumption, it was only necessary to give the test to a large group of pupils, then to calculate the percent of the pupils making correct responses on each item, and then, by referring to tables of the normal curve, to translate the answer to each question into a numerical scale value based upon what was called "the difficulty of the question."

Yet another assumption used to scale tests was that, when each member of a group of judges was asked to place answers or other psychological data on a scale of units that seemed to the judge to represent equal differences in quality, the average placement for each answer would be expressed in units that were equally spaced on the scale. A great deal of attention was paid during this period to the problem of establishing numerical units in terms of which the results of educational tests might be expressed.

3. The Influence of the Program and Techniques of Intelligence-Testing

A third major influence in educational measurement was the intelligence-testing movement. Since many persons who had constructed intelligence tests were asked to build educational tests, and because most of the other educational testers were profoundly impressed by the intelligence-test program, certain techniques used by the intelligence-testers naturally dominated the procedures in making educational tests. Intelligence tests for school children were commonly validated by getting a fairly high correlation between the test results and the teachers' judgment of the children's brightness or between the test results and their school marks. Surprisingly enough, educational testers who were continually criticising the lack of validity and reliability of teachers' marks, frequently used the same marks as the criteria of good tests for measuring the results of instruction. Another method of intelligence-testers was to validate individual items by their relationship to the total test score. This was done by calculating bi-serial r or by determining the difference between the percentage of correct responses among the

pupils who made high total scores on the tests and those who made low total scores. This method, too, was taken over by those making educational tests. Probably because of this influence of the intelligence-testing movement, when the question of the validity of an educational measurement was raised, a fairly high correlation between the test results and the teachers' marks was accepted as assurance for the validity of the test, while a high relation between the response on an individual item and the total test score was accepted as a guarantee of the validity of the item. Obviously, however, this procedure could not guarantee a total test that was more valid than the teachers' judgments and could assure only homogeneity of items, not their validity.

4. The Subjectivity and Unreliability of Traditional Examinations

The evident lack of objectivity and of reliability in traditional examinations was a fourth, and perhaps, the most potent influence upon the early testing movement. It was easy to show that the same examination paper when marked by a large number of teachers was given a variety of marks, ranging in some cases from 25 to 95. It was also simple to collect evidence that the same person when marking a set of examinations a second time assigned different marks to many of the papers. The accumulation of such evidence made it clear to those interested in examinations that the mark a student received on a paper depended not only on the quality of his answers but also upon the judgment of the marker, which varied both among individuals and also among different markings by the same individual. This criticism of the subjectivity of traditional examinations caused test-builders to give prime consideration to examinations that could be scored objectively. They ignored, however, the fact that the selection of the form of the test and of the test items was itself an obviously subjective process that greatly influenced the test results.

Another deluge of examination criticisms was concerned with the adequacy of the sampling of test questions, often called reliability. The typical examination with five, ten, or twenty questions did not give an adequate sample of the student's responses to serve as a basis for a dependable estimate of his attainments. When the student was given a second set of questions covering the same material, his mark was often widely at variance with that obtained from the first examination. Because this fact was brought home so forcibly, educational testers gave careful study to reliability. Reliability was measured by the cor-

relation between the two sets of scores obtained from two similar tests covering the same field. Measured in this way, reliability was quite distinct from validity.

II. SOME CONTRIBUTIONS OF ACHIEVEMENT TESTING IN THE EARLY PERIOD TO OUR THINKING ABOUT THE EDUCATIVE PROCESS

During the first thirty years of the achievement-testing movement the constructors of tests, as we have just noted, concentrated their study upon developing forms of questions to be scored objectively, upon standardizing test items in terms of the percentage of pupils who answered the items correctly, upon developing tests that had a high coefficient of reliability, and upon constructing comparable forms of the same test. They gave less consideration to the problem of how well the tests measured the important outcomes of education. When validity was considered, it was largely conceived in terms of the coefficient of correlation between the test results and the teachers' marks, or between the response on an individual item and the total test score.

1. A Better Understanding of Learning

However, even though they did not explicitly formulate procedures for studying the nature of the outcomes sought in education, the developers of achievement tests did contribute to a better understanding of some of the psychological aspects of the learning process. For example, early in the development of arithmetic tests, speed and accuracy were identified as two different aspects of growth in arithmetic computation. The difference between the pupils' effectiveness in oral and in silent reading was similarly identified, and tests were built both for oral and for silent reading. Furthermore, speed and comprehension in silent reading were recognized as different aspects, and tests attempted to appraise each separately. During this early period several aspects of reading were distinguished and tests correspondingly differentiated. Thus, for example, separate tests were developed for word recognition, for sentence understanding, and for paragraph comprehension. Others developed tests for identifying the main idea of a selection, for finding details in the reading material, for outlining, and for certain other aspects of the reading process. In arithmetic, problem-solving was differentiated from the so-called fundamentals. During this early period, in short, the testers were beginning to recognize the fact that a single school subject involved a number of psychological aspects—that is, a

number of types of pupil behavior—and that it frequently could not be adequately appraised in terms of a single test involving a single type of behavior. The psychological analysis of the outcomes sought in education was emphasized much more during this early period by those conducting laboratory studies of learning than by the educational testers. However, these initial analyses previously mentioned had some influence upon the recognition by teachers of the greater psychological complexity of their task than they had previously realized.

2. Improvement and Difficulties in Selecting Significant Content for Tests

During this early period, also, the importance of test content that had functional significance to the pupils began to be recognized. In the case of spelling tests, for example, the words were selected for inclusion in the test on the basis of their frequency of occurrence in various printed materials and in children's writings, as well as on the basis of their difficulty. This was, at least, an implicit recognition that the content of tests should be functionally significant to the pupil.

Generally, however, the content for test questions was not selected on the basis of any thorough investigation of its functional importance. Instead, in the content subjects, one major technique for selecting test content was to list those statements common to at least a majority of the widely used textbooks on the subject. Thus, for example, the content for a test in chemistry would be determined by analyzing the contents of four or five of the most widely used chemistry textbooks, identifying those statements common to three or four of the textbooks and building the test from a sampling of these common statements. This method provided a selection of items likely to have been met by those pupils who used one or more of these textbooks. It was an improvement over the judgment of an individual tester as to what was likely to have been the content covered by particular groups of students. The technique did not, however, provide any further guarantee as to the significance of this content than the fact that several authors included it in their books. Since the textbooks actually in use in many schools were likely to lag behind curriculum development, it is likely that the test content would tend to be inadequate with reference to those items emphasized in more recent curricula. It is also true that some textbook writers used only their personal judgments as to the functional value of particular content, and these judgments were no more valid than the sagacity and

professional competence of those who made them permitted. Furthermore, the technique involved the obvious assumption that material included in the textbook should be remembered. It did not provide a way of identifying the kind of behavior appropriate for each type of content. Textbooks include illustrations used to clarify an idea that are not in themselves to be remembered and still other types of supporting material that may not be important for students to react to in a test. This method of selecting content did not automatically relate the test content to the type of behavior in connection with which the content should be significant to pupils.

A second technique for selecting test content was to identify the material common to several courses of study. If the courses of study had been well constructed, this method would have certain advantages over the textbook analysis. In a well-constructed course of study considerable attention should have been given to the functional values of the content included. The content selected from these courses of study would be more likely to be significant to pupils than some of the content obtained by textbook analysis. Furthermore, a well-constructed course of study should relate the content to the educational objectives and serve to indicate the type of content appropriate for different types of behavior to be tested. However, very few courses of study agreed in their methods of organizing content and classifying objectives. A mechanical tabulation of common content for several courses of study gave a heterogeneous mass of incomparable material.

A third technique for selecting test content was to select the most commonly stated examination questions obtained from a collection of questions given in state, county, and local examinations. This technique had little to recommend it beyond the obvious fact that the questions thus selected were more likely to include the type of questions students were accustomed to being asked. It might possibly have provided a fair representation of the content considered important by those who formulated the original questions, but there was no guarantee even of this, since a very common tendency for untrained examiners was to ask questions that they thought difficult or 'off-trail' rather than to ask those questions that cover the most important content. Furthermore, certain kinds of content were likely to be neglected because in the past teachers had not known how to test for this content, and consequently omitted such material in their examination questions.

In the use of tests during this period emphasis was placed particularly upon school surveys, upon appraising the work of a particular school, a particular grade, or a particular teacher, upon the importance of discovering those students who were not working up to their capacities, upon a more objective system of grading and promoting pupils, and upon the use of tests in educational experimentation. As with all young movements, many of these efforts were ill-conceived and many of the persons who attempted to use tests did so without a clear understanding of the purpose of the project or of the advantages and the limitations of the tests they employed. For this reason it may fairly be said that thousands of tests were given only to be scored and placed away in files, where the results were not used. The increasingly critical character of the discussions and of the papers written about the use of tests during the latter part of this period indicated an increasing recognition of the limitations and of the dangers of enthusiastic, but unintelligent, use of testing instruments.

With due allowance for these unwise enthusiasms, the testing movement during this first period seems to have exerted fundamentally significant influences upon educational thought and practice. One very significant effect was the greatly increased recognition on the part of teachers, supervisors, administrators, and students of education of the need for supplementing their own individual judgments regarding educational results by the use of more objective evidence. Previous to the development of the achievement-testing movement the solutions to educational problems were largely reached by asking for the off-hand judgments of teachers and school officers. These judgments were in general based upon personal impressions and recollections of unrecorded experiences. In other cases, educational problems were solved by the use of criteria regarding the learning and teaching process—criteria that were in turn based upon *a priori* judgments as to the desirable qualities of good teaching or of effective learning experiences. Although many of these impressions and judgments may have been sound, it is also true that many of them were inaccurate, biased, and based upon very limited evidence. Hence it was difficult to distinguish the valid hypotheses from the invalid, and to separate the dependable evidence regarding effective learning from the unreliable and purely subjective impressions. From this welter of fact, opinion, hypothesis, theory and principle, many students of education reached very different conclusions. This led to vehement support or equally vehement opposition to various educational

practices. The proceedings of educational associations during the latter part of the nineteenth century indicate clearly an attempt to settle teaching problems by argument, by impassioned pleas, or by consensus. The achievement-testing movement provided a new tool by which educational problems could be studied systematically in terms of more objective evidence regarding the effects produced in pupils. The hope that problems could be settled by reference to fact rather than subjective impression or emotionally colored opinions has probably been the strongest influence of the achievement-testing movement in the past forty-one years.

3. Improvement in the Materials and Methods of Instruction

Growing out of this attempt to solve educational problems through the collection of evidence regarding the effects upon pupils were several noteworthy changes in teaching materials and procedures. Oral reading is no longer the major type of reading taught in schools. The textbooks and other materials in the elementary schools, particularly in the fields of reading, arithmetic, and spelling, have been more carefully graded than was possible before the development of tests in these fields. The recognition that the abilities involved in problem-solving in arithmetic do not automatically evolve from the development of facility in addition, subtraction, multiplication, and division, largely grew out of the use of tests. This in turn has greatly modified the arithmetic program in most schools. As a result of studies using tests, the procedures followed in the teaching of spelling have been radically revised in the past forty years.

In similar fashion, although less markedly than in the case of the so-called 'tool subjects,' the content courses in the elementary school and in the high school and the college have been modified as a result of using tests. Studies of intensive versus extensive reading in literature courses, studies of various methods of teaching the foreign languages, studies of class size, studies of laboratory methods versus lecture demonstration methods in the sciences are illustrations of investigations whose findings were largely dependent upon the results of achievement tests that have had great influence upon the procedures now followed in the teaching of these subjects. Changed practice resulting from the findings of studies using tests was a second great influence of the achievement-testing movement during the first thirty years.

4. Stress on the Value for Interpretation of Significant Common Standards

Another influence of the testing movement during this period grew out of the emphasis given to comparability and standardization. Teachers and school officials showed an increasing interest in interpreting the results of their school program against the background of other schools and of larger geographic areas. There was an increasing recognition that the marks or other common types of appraisal assigned by one teacher or by one school might have a totally different meaning from similar marks assigned by another teacher or another school. The desire for some kind of common standards or common basis for interpretation was increasingly evident. This influence was not entirely good, but it was probably a helpful one at that time. It led to a more common definition of terms used in appraisal—such as grade equivalents, age equivalents, percentile ranks—supplied a means for communicating results from one school to another, and increased the probability that other schools might understand and use the results obtained in a given school system. When carried too far, this desire for common standards naturally led to an undesirable uniformity, but fortunately this overemphasis was not general.

5. Development of the Concept, Educational Diagnosis

Another very significant influence of the testing movement during this early period was the initial concept of educational diagnosis. At first, tests were given to see how well students did and to allocate praise or blame upon students, teachers, or school systems. Within two decades this led to the notion that tests might be used to locate difficulties that individual pupils or groups of pupils were meeting. The idea that educational diagnosis might be possible through the use of achievement tests and that this would lead to more precise treatment and a more effective educational program was eagerly accepted by many teachers and students of education. The development of this concept in practice during the early years was greatly limited by the lack of adequate diagnostic tests, but the acceptance of the idea and the desire to use tests for these purposes represented an obvious influence easily discernible during the first thirty years of the testing movement. Even without adequate diagnostic tests, the use of tests has greatly influenced the degree of learning. Several studies have shown that ordinary class discussion re-

sults in negligible educational achievement in comparison with teaching procedures involving formal or informal tests.

6. Change in the Teacher's Conception of His Job

In appraising the relative significance of the developments during this early period it seems to the writer that the most important influence of the testing movement was in extending the teacher's conception of his own job. An increasingly large number of teachers, most of whom were leaders in the field, began to conceive of their function more as students of learning rather than dispensers of information. The influence of this attitude upon the schools must have been tremendous, though it is difficult to appraise accurately.

III. THE SECOND PERIOD OF ACHIEVEMENT TESTING

1. Criticisms of the Program

The second period of the achievement-testing movement began about 1927. The early part of the period was characterized by the publication of critical treatises written largely by test-constructors themselves emphasizing the need for precaution in the uses of educational tests. At this time also there appeared severely critical attacks upon the testing movement and upon the extremes to which the movement had gone. In general, these attacks emphasized the fact that the existing tests did not adequately cover all of the outcomes desired in the educational program and could not, therefore, be used as an adequately comprehensive indication of the effectiveness of an educational system.

Other critics emphasized the fallibility of the sweeping conclusions that were being drawn from test data and the dangers of thinking of the testing movement as a panacea for educational problems.

Still a third group criticised the testing movement because it concentrated upon static educational objectives. It was accused of perpetuating the *status quo* in education rather than helping teachers and students of education to improve their work. It was said that the testers were seeking to develop a series of permanent unchangeable tests that would greatly obstruct the development of a flexible and fluid curriculum needed to meet the changing conditions of the modern world.

A fourth type of criticism emphasized the tremendous influence that testing was exerting upon teaching. Teachers and pupils were concentrating their efforts upon those aspects that were tested. It was said

that tests had become a standardizing agency enforcing uniformity rather than a measuring stick to help intelligent persons.

2. Extension of the Range of Objectives Tested

These criticisms, undoubtedly, had considerable influence in shaping the changes that took place during the following eleven years. Some of the test-constructors began to emphasize the notion that the purpose of a test was to find out how far students had attained important educational objectives, and that a testing program would be inadequate unless it provided dependable evidence indicating how far the pupils were attaining each of these important objectives. They recognized that the available tests measured only certain aspects of educational development. There were tests for appraising some of the so-called 'fundamental' skills, other tests that indicated how far pupils remembered the facts supposedly covered in the content subjects, but beyond these points most tests had not gone. In the meantime, schools were beginning to emphasize a much broader range of objectives. They were concerned with developing various aspects of thinking, such as the ability to interpret experimental data in sciences, the ability to apply important scientific principles, the development of a wider range of reading interests, the development of more effective health habits, the ability to locate and to organize facts when making a study of a particular problem, and so on. Such objectives as these were not appraised by the existing tests. During the past eleven years the test-constructors have been extending markedly the range of objectives for which tests are being developed. Attitude tests, tests covering various aspects of thinking, tests of reading interests, tests of work habits and study skills, tests of appreciation, tests of social adjustment have been or are being constructed. These are merely illustrations of the range of objectives toward which the efforts of achievement testers have been directed.

The extension of the range of objectives being appraised has lead also to the recognition that achievement testing involves more than the use of paper-and-pencil exercises. Increasingly, test constructors are defining their task as the collection of evidence regarding the degree to which pupils are attaining the desired educational objectives. Where this evidence can be obtained through paper-and-pencil exercises, so much the better, as these exercises can be more easily handled. However, when the nature of the educational objectives demands other methods, such as observation of children at play, an appraisal of the

products they make, the use of carefully planned interviews, the use of questionnaires, the making of case studies, all of these are appropriate insofar as they provide significant evidence regarding the attainment of educational objectives. Thus, the conception of achievement-testing has been markedly extended during the past eleven years.

3. Coöperative Construction of Tests

A third emphasis given to achievement testing during this latter period has been coöperative test-construction. Previous to this time, most tests were constructed by a few test technicians and then used widely in various schools. Most of these tests did not involve any careful consideration of the educational objectives of the subjects for which the tests were constructed. The characteristics to be appraised were largely assumed and were not made matters of explicit study. In the case of the fundamental skills this oversight was probably less serious. In the case of the content subjects, however, the treatment of content as though it were merely to be remembered neglected a great many important educational objectives. Even when these educational objectives began to be more widely formulated, it was difficult for an outsider—that is, one who was not a teacher in this field—to identify the kind of content most appropriate for different sorts of educational objectives. Hence, it began to be recognized that valid tests could be better built as a coöperative enterprise participated in by teachers, by the proper curriculum-makers, and by test technicians. Furthermore, some of the pioneers in the testing movement had discovered that the work of test-construction was a valuable type of teacher training. Whatever may have been the causes, the second period of the testing movement has been characterized by a very large emphasis upon coöperative test-construction. Most of the achievement tests now being built are made by test technicians, teachers, and other curriculum-workers.

4. Testing Viewed as One Phase of Learning

A fourth development of this later period has been the attempt to make testing and teaching both parts of the same learning process. Testing in this sense is no longer a culminating activity, but instead is a process which takes place periodically throughout the learning period beginning before any formal teaching is done. In this way evidence is obtained regarding the effectiveness of the educational program and also there is possible a more effective educational diagnosis, which can

be utilized immediately in improving the treatment given individuals and groups of students. In making testing a more integral part of the learning process, the tendency is for tests and curriculum to be developed together.

This closer relation between tests and the curriculum is leading to a changed conception of scoring or appraising test records. In the early period the purpose in appraising a test was to arrive at a single total score that would indicate the relative achievement of the pupil. Emphasis was also placed upon sampling reliability, called 'statistical significance,' rather than upon the educational or social significance of these scores. With the changed emphasis upon diagnosis and helpfulness in instruction the purpose of appraisal is coming to be an attempt to get an accurate description of the difficulties and successes pupils are having and to give attention to the educational, as well as to the statistical, significance of the description. For this purpose a single score is much less useful than the development of scoring methods or verbal descriptions that give a more helpful diagnostic picture of the pupils.

5. The Influence of Achievement-Testing in General

Identifying the influences of achievement-testing upon education during the past eleven years is difficult because we are still working in this period and have not the temporal perspective required for a careful appraisal. Certain influences, however, seem obvious. Certainly, achievement-testing is no longer considered the panacea for educational problems. On the other hand, more teachers are engaged in constructing and using tests than ever before. It is also evident that the conceptions of educational diagnosis and of educational guidance have matured far beyond the early beginnings in the previous period. Tests are providing tools by which diagnosis and guidance may be more effectively performed. Furthermore, the testing movement during this period has given some impetus to the idea that the study of children provides a basis for more effective work on the part of each individual teacher. More use is being made by teachers of facts regarding the characteristics of their own pupils. These facts are largely obtained through the use of tests and have become an important factor in curricular development, whether carried on by individual teachers or by school systems. The testing movement has helped to give significance and strength to the idea, first expressed many years ago, that a teacher's job consisted of studying his pupils and then doing those things indicated as needed by that study.

In general, the most important contribution of this latter period of the testing movement has been its influence upon the curriculum. Studies of the curriculum have been concerned with formulating educational objectives and suggesting educational experiences and materials that could be used to obtain these educational objectives. The coöperative nature of test-construction during the last eleven years has given many teachers a kind of experience that has been reflected in their work on the curriculum. In constructing a valid achievement test it is necessary to clarify each important educational objective, to define it in terms of pupils behavior. Most educational objectives as they have been stated in courses of study, or by teachers, have been expressed in vague and glittering terms. Such things as social sensitivity, appreciation of literature, desirable reading interests, and ability to think are illustrations of frequently stated objectives that either mean many things to many persons or mean little or nothing to most persons. Because of their vagueness, these statements have frequently served to ornament the first pages of the course of study but they have not really operated in the teacher's activities or in the selection of learning experiences and materials. The necessity in test-construction for defining such objectives clearly in terms of pupil behavior has served to clarify to a marked degree the meanings of the outcomes that teachers are seeking. As these objectives are clarified, they tend to become real and to become the actual basis for the selection of learning experiences and materials.

Furthermore, as tests for these objectives have been developed and utilized by the teachers, the results have lead to the modification of the curriculum. This revision is frequently traceable to the fact that the test results indicate that the educational procedures are not attaining certain objectives, or in other cases the results give further clarification to the objective itself, making it clear to the teacher that his original conception of the desired outcome was not as important as he had thought. A kind of cyclical process has developed in which teachers formulate their objectives, define them more clearly, attempt to select materials and experiences in terms of the objectives, construct or select tests for appraisal in terms of these objectives, and then utilize the test results as a basis for revising the curriculum; then repeat these steps. This kind of a technical procedure that is developing with the testing movement gives testing an important place in curriculum development. The construction and use of achievement tests are becoming both a purpose and a tool in the development of a better educational program.

CHAPTER XXX

THE SPECIFIC TECHNIQUES OF INVESTIGATION: TESTING INTELLIGENCE, APTITUDES, AND PERSONALITY

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The history of intelligence testing, aptitude testing, and personality testing shows in each case: first, a period of preliminary scientific exploration; second, a period of rapid growth with exaggerated expectations of the value of the tests; third, some reaction that tends to swing too far in the other direction and to discount unduly any potentialities; and finally, general acceptance of modest but substantial contributions. We shall follow each of the three types of test through these four stages.

I. INTELLIGENCE TESTS

1. Their Beginnings in the Laboratory and School

The period of scientific exploration of individual differences began in three nations with the establishment of Wundt's Laboratory at Leipzig in 1879, Galton's Anthropometric Laboratory in London in 1882, and the Beaunis-Binet Laboratory at the Sorbonne in 1889. The last decade of the nineteenth century saw Ebbinghaus using tests of memory for digits and of sentence completion; Kraepelin and Oehrn testing learning, letter-counting, letter-cancellation, and addition; Cattell's publication (1890) of "Mental Tests and Measurement" and also his application of tests of vital capacity, grip, vision, reaction time, pain, memory, imagination, and attention to Columbia University students; Jastrow's tests of weight discrimination, judgment of distance, reproduction of lines from memory, reaction time, accuracy of movement, memory for letters and colors, at the 1893 Columbian Exposition; Münsterberg's tests of classification, color-matching, and drawing a square; the founding by Witmer of the first psychological clinic, at the

University of Pennsylvania in 1896; and the publication by Binet (1898) of *Measurement in Individual Psychology*, which included proposals for such tests as: ability to draw a square, to rearrange dissected sentences, paper-folding, memory for digits, and comprehension of abstract passages. During the first decade of the twentieth century, Thorndike began his studies of mental fatigue and transfer of abilities, published in 1904 his *Introduction to the Theory of Mental and Social Measurements*, and proposed revisions for college entrance examinations. In 1904 Binet was made a member of a commission to study special classes in the public schools of France and was stimulated to bring into practical use his previous work on tests. The first Binet scale of 30 tests appeared in 1905, and the elaborated scale in 1908. By 1910 Goddard had carried out a standardization on some 2000 American children. In 1912 Stern first suggested the ratio so widely known today as the I.Q. The publication in 1916 of Terman's first "Stanford Revision of the Binet-Simon Intelligence Scale" culminated a quarter-century of development based on contributions from psychologists of four countries.

2. Their Stimulation by the War

The epoch of high hopes and exaggerated expectations was set off with a bang by the World War. Psychologists worked in feverish cooperation, developing group tests to be given by the thousands to army men. Intelligence tests were expected to identify not only the feeble-minded but also the talented, to predict school success and also vocational success, to prognosticate delinquency, to reveal native endowment, and to answer scientifically long disputed questions of race difference and sex difference. The financial return from the sale of large quantities of group tests, such as the Otis, National, Dearborn, Terman, Thorndike, Thurstone, American Council on Education, and the like, supported further research and refinement of technique. Items were better selected, reliability rose, administration was simplified, scoring was mechanized, and better norms were established. Non-language tests to reduce some sensory or language handicaps were developed by Myers, Pintner, Porteus, Goodenough, and others. Tests especially adapted to young children were prepared by Kuhlmann, by workers at Merrill-Palmer School, and by Gesell. Major theoretical advances came with the work on factor analysis introduced by Spearman in 1904 and continued in one of the sprightliest controversies of modern psychology

with Thomson, Thorndike, Burt, Kelley, Thurstone, Hotelling, and Tryon.

The main purpose of this chapter is not a review of the scientific advance, but rather of the contributions to education; so we turn to the significant progress that has been made possible by intelligence testing.

3. Their Bearing on the Education of the Mentally Inferior

The first concern of Binet was with the identification of the feeble-minded. The success has been extraordinary. There is probably no modern institution or clinic that would make diagnoses of mental deficiency without intelligence tests. Some reaction has been necessary from too extreme reliance upon I.Q.'s alone. There are other factors beside intelligence-test score that determine competence to earn a living and to manage one's affairs as an acceptable free citizen. More important, however, than the classification of defectives is the idea of continuity in the range of mental ability. The mind of the moron or imbecile differs from the normal in degree, but not in kind. The same principles of purposive learning and development apply throughout the whole range. The lines of classification have been shown to be much more arbitrary than they seemed to laymen or to lawyers in the days before extensive measurement of intelligence.

4. Their Bearing on the Education of the Mentally Superior

The discovery of persons of superior ability has been greatly facilitated by mental tests. It may be that the greatest value of tests will prove to be the consequent urge to provide better opportunities for the ablest children. The principle of continuity, in the case of superior as with inferior minds, has helped to dispel the idea that genius must be a freakish prodigy. Investigations like those of Terman and Hollingworth have shown the truth of Thorndike's early observation that, contrary to popular belief, "it is very very hard to find any case of a negative correlation between desirable mental functions." This contribution, also, has been carried to extremes by those who have used intelligence tests as if they indicated all of human worth. Real genius requires far more than the possession of an I.Q. over 140, and our culture has been tremendously enriched by persons of moderate mentality.

It would be unfortunate to imply that education has taken full advantage of the service of tests in locating highly intelligent pupils. Too

often gifted children still are regimented in assignments far below their abilities. Too often economic and social barriers prevent them from continuing their education. Toops estimates that if all children of Ohio above the fortieth percentile in intelligence, and only those children, went on to college, all the colleges of Ohio could not accommodate more than half of them. And, as Mrs. Hollingworth has pointed out: "Scholarships for the élite are inconsiderable in contrast to the huge sums now spent upon the dull, the vicious, and the unbalanced."

5. Their Bearing on Curricula and the Administration of School Programs

The adaptation of school programs to the ability of the learner has been greatly advanced by the use of intelligence tests. Binet foresaw this service in 1909 when he wrote: "I understood then what an error was being made in judging these children according to tests that were not made for minds of their nature, and especially in giving them a kind of instruction that was contrary to their intellectual type . . . It is according to children's aptitudes that they should be instructed and that they should be directed toward a profession . . . In schools with large enrollments a method of sectioning pupils on the basis of their aptitudes would be possible."

The first impulse of educators was to reject variant pupils rather than to follow Binet's advice and adapt curricula to individual needs. Pupils were segregated in 'special classes' if their I.Q.'s were found too low to fit the current classroom practice. Many studies appeared on the 'prediction of success' in the first grade or in the high school or the college, and again the assumption was that pupils who did not fit the traditional routine were to be excluded. The school system was held sacred; the individual child must be adapted to it. Actually the selective process did not get very far. Toops showed that in Ohio the college entrants represented a fair cross-section of the high-school seniors in intellectual ability, and high-school entrants include an ever-larger proportion of the grade-school children. Hence wide differences in intellect had to be accommodated within each school.

Attempts at homogeneous grouping were made in an endeavor to reduce the range and to permit the system of uniform assignments to continue. At first, intelligence alone was the basis of grouping, but later other considerations, such as school achievement and social adjustment, were given equal or greater weight. McGaughy criticized homogeneous

grouping on the ground that achievement in various school activities varied so much that reducing the range in one ability left practically the full range in other abilities, hence the class could not be 'homogeneous' in more than one subject. Keliher summarized in her dissertation, "A Critical Study of Homogeneous Grouping," other educational and social considerations leading to the conclusion that sectioning in accord with intelligence had been seriously overdone, and actual adaptation of education to individual needs, seriously neglected. Rankin's review, "Pupil Classification and Grouping" in 1931, showed little positive evidence for the value of current practice in sectioning.¹

6. Their Bearing on College Entrance

Mental tests performed a major service in helping to free college education from the old-type specified entrance requirements. As it became apparent that the success of pupils in college could be better predicted from their intelligence-test scores than from the pattern of subjects studied in secondary school, a few college officials began to reconsider the basis for college admission. This, together with pressure from progressive educators interested in modifying the secondary-school offering, has led to a marked change during the last five years. Many colleges are now ready, experimentally at least, to seek for measures of academic ability independent of so many units of this-or-that subject completed in the secondary school.

The fact that correlations between intelligence tests and school success consistently appeared only fair (usually between .30 and .60) forced attention to other factors involved in school success. This was particularly true in those cases where high intelligence accompanied school failure. Attention was necessarily turned to emotional and environmental handicaps, and to the appropriateness of the school requirements.

It seems fair to judge that the use of intelligence tests has led thus indirectly to all-round study of the individual and the breaking of the lock-step in education. The early tendency to use tests for selection or grouping in such a way as to justify continuation of two or three parallel 'chain-gangs' moving through the same texts at different rates, is

¹ A more recent and somewhat different picture of this situation will be found in the Report of this Society's Committee, working under the chairmanship of W. W. Cox. See *The Grouping of Pupils*, the Thirty-Fifth Yearbook, Part I, 1936.—Editor.

gradually giving way to education flexibly adapted to unique persons. Undoubtedly studies of the personality needs of individual children, and of their needs in health, home life, vocation, leisure, and social adjustment have done much to enlarge the too-narrow concept of individual differences resulting from exclusive use of a single intelligence scale.

7. Their Bearing on Delinquency

Delinquency, a generation ago, was commonly attributed to mental deficiency. Pintner finds sixteen studies before 1916 reporting an average of 64 percent of the delinquents feeble-minded, while Healy in 1922 found only 7 percent of 1212 cases of the delinquents studied, feeble-minded. Intelligence tests have assisted in the early location of mental defectives and their placement in appropriate institutions, thereby reducing the number who become truant and delinquent. Tests have made it clear that the heart of our delinquency problem is with the dull-normal child, who may be at, or above, normal in mechanical, social, or other non-verbal skills. A school curriculum still adapted mainly to verbal and arithmetic performance undoubtedly plays some part in occasioning the truancy that usually precedes delinquency. Our best understanding of delinquency, however, is coming, not from mental tests, but from case studies of individuals and of gangs.

8. Their Bearing on Occupational Guidance

Misguided enthusiasts hoped at one time that arrangement of occupations in accord with the amount of intelligence required for each might enable vocational counselors to assign youths of known I.Q.'s to one or a few jobs. Analysis of the army data by Thorndike showed enormous overlapping among occupations. The 25-percentile engineer was equalled by the 75-percentile unskilled laborer. The 75-percentile shipping clerks surpassed in intellectual ability 25 percent of the physicians. Hence the contribution of intelligence testing to vocational guidance is reduced to the more modest, but still useful, function of indicating the improbability that an individual in the lower intelligence levels could succeed in the training required for a few positions requiring a high degree of abstract thinking. No vocational counselor today depends on intelligence tests alone, but most counselors would feel handicapped in the guidance process if they could not know the I.Q. of the student.

9. Their Bearing on Adult Education

Intelligence testing and tests of learning ability have contributed to a most significant change in adult education. The first intelligence tests, misinterpreted to give the average adult a mental age of twelve or fourteen, had the effect of belittling adult intellect; but more careful work, such as that by Thorndike, Jones, and Miles, has shown that the rise in mental powers continues up to nearly thirty years of age and that there is thereafter little decline, except in speed reactions, until senescence. The idea that adults can adapt to new situations not only opens new worlds for many grownups, but also frees the elementary school and the youth school from the burdensome necessity of teaching content not of present significance in the lives of the pupils, but likely to be needed some day. If these facts or skills should be needed later, the intelligence of adults will be adequate to learn them.

10. Their Bearing on Sex Differences and Coeducation

The widespread acceptance of coeducation, especially at higher levels, is due in some measure to the service of intelligence tests in demonstrating that boys and girls do not differ appreciably in ability to do logical or abstract thinking. Perhaps this too has been followed a little too blindly. Stolz shows in data still being prepared for publication that the earlier maturation of girls has important consequences, if not for intelligence-test scores, yet certainly for educational practice.

11. Their Bearing on Racial and Social Differences

Race differences apparent in mental tests early became a source of controversy. On the facts that all known races overlap, and that many of the most 'inferior' racial group surpass the average of the most 'superior' racial group there was agreement. The question of the interpretation of such differences as do appear was answered by some in terms of innate endowment, by others in terms of the appropriateness of the tests, and by yet others in terms of the educative opportunities afforded in the environment. Klineberg's work in particular leads to the conclusion that 'inferior' races appear wherever inferior schooling and otherwise limited opportunity are given, but that these same groups approach equality of performance when given equality of economic, cultural, and educational opportunity.

Apparent differences in intelligence among social classes have led to similar controversies. Some have held the superior average scores of

professional and business class groups to be evidence of superior endowment; others interpret the same differences in terms of opportunity. A neglected fact of considerable educational and social significance was pointed out by Stoke and Lehman. Owing to differences in the number of persons in each social group, the majority of gifted children of this country come from the less privileged groups—unskilled labor, skilled labor, and farmers; that is, despite a relatively smaller number of individuals of high intelligence, the less favored economic and social groups will supply absolutely the greater number of the potentially ablest leaders.

12. The Nature-Nurture Controversy and the Limitations of Training

The controversy over race differences, class differences, and the significance of providing greater equality of opportunity has led to the nurture-nature investigations. The constancy of the I.Q. under conditions of ordinary variation in the environment led to the assumption, widely accepted for about ten or fifteen years, that intelligence tests measured an innate, inherited, and unchanging aptitude. Studies in the *Twenty-Seventh Yearbook* of this Society indicated that all students of the problem must accept some modification of the I.Q. with more or less favorable environment during childhood. The only question left to be debated was the extent of change that could be brought about. Recent work by Wellman on the increased I.Q. of children given certain nursery-school opportunities, by Skeels on adopted children, by Klineberg on race differences, and by Freeman on identical twins reared in different surroundings have further increased the scientist's estimate of the modifiability of general intelligence level. The "constancy of the I.Q." seems now to mean that society in general and educators in particular are not applying the type of educational treatment that might bring considerable increase in the effective intelligence of many young persons. There remains, however, the limiting truth that nothing we now know how to do will improve greatly the intelligence level of children after they have reached school age. We can and do, of course, teach them how better to use such intelligence as they develop.

13. Future Possibilities

There is great need of more developmental studies. The assumption of an I.Q. fluctuating only because of errors in measurement, justified

the easier cross-sectional studies of particular age levels. Courtis and others have pointed out that growth does not proceed at a uniform rate, and our few continuous records (such as Terman's gifted children, the Pennsylvania study of the Carnegie Foundation, the Brush Foundation study, the Harvard Foundation study, and the Oakland study of adolescents) are revealing another kind of variation to be studied by mental and other tests. Education in the future may find itself even more indebted to intelligence testing for evidence about differences in the same person at different stages of his growth than it is today for evidence about differences among persons.

II. TESTS OF SPECIAL ABILITIES OR APTITUDES

Scientific exploration of individual differences began, as noted in the account of the history of intelligence testing, not with a general ability called 'intelligence,' but with many specific traits and aptitudes. Until Binet used an average of performance at many different tasks as a measure of general ability, it was commonly assumed that psychological study of an individual meant the discovery of his pattern of relatively good and relatively poor abilities. Memory for digits might be excellent, but reaction time slow.

1. Their Beginnings and Development

So much interest was drawn off into the new intelligence tests that aptitude testing developed slowly during the first twenty years of the twentieth century.² In 1913 Münsterberg was testing telephone girls and streetcar motormen for speed, memory, attention, observation, accuracy, and performance in tasks something like their work. Most of the tests of special abilities that we use today were developed in the period from 1920 on. The Miles pursuit-meter was described in 1921, the Stenquist Mechanical Assembly Test in 1923, Oseretzky's Motor Tests in 1925, the Brace Motor Ability Tests in 1927, the Keane and O'Connor Wiggly Block Test in 1927, MacQuarrie's Test in 1927, the Cox Tests in 1928, and the most comprehensive, the Minnesota Mechanical Ability Tests, in 1930. The Seashore tests of musical talent appeared in 1919, Kwalwasser's tests in 1927, and More's battery of old and new tests of musical ability in 1932. The art tests of Lewerenz,

² A general summary of the significant tests and the results obtained by their use in 1910 is found in the first edition of G. M. Whipple's *Manual of Mental and Physical Tests*. (Warwick and York: Baltimore)

Meier, McAdory, and Knauber all appeared within the past ten years. Aptitude tests for Latin and algebra have been developed within the last few years by Orleans, for medicine by Moss, for law by Ferson and Stoddard and also by Thorndike, for nursing by Jones and Iffert, for teaching by Coxe and Orleans, and for clerical work by O'Rourke, Rogers, Link, Tuttle, Thurstone, Yoakum and Bills, and also by the National Institute of Industrial Psychology. Bingham has studied and summarized tests to locate men especially prone to accidents. Johnson O'Connor's handbook of tests used in the employment service of General Electric was published in 1928 under the title *Born that Way*. In that same year, when Hull wrote his treatise on *Aptitude Testing*, he could describe all that had been done in relatively short space and used most of the book to guide workers interested in developing new aptitude tests.

We are probably still in the period of expansion of the number and variety of aptitude tests, and certainly in a period that will see considerable improvement in the quality of aptitude tests. It is therefore a little early to discover the full impact of such techniques upon education.

While a few workers have remained enthusiastic over the use of tests for predicting special abilities (for example, Stanton's several reports on the use of the Seashore tests at the Eastman School of Music), the usual experience has been disappointment. More typical is the experience of Paterson, Elliott, and their associates with the Minnesota Tests of Mechanical Ability. Correlations of six different tests with a quality-quantity criterion for 100 junior-high-school boys ranged from $-.01$ for block-packing to $.24$ for the Minnesota Assembly Test. There may be more hope in a pattern or profile of factors than in a single correlation or multiple correlation.

2. Their Bearing on Vocational Guidance

The trend in vocational guidance has been away from the once popular idea of tests that analyze aptitudes and toward more emphasis upon study of occupations. It is assumed that the individual's knowledge of his abilities, drawn from previous experience, will compare favorably with any laboratory report. On the other hand, several follow-up studies indicate that the pupils who act on the advice of a vocational counselor do make more satisfactory occupational adjustments. Macrae followed up 100 cases and found those who followed the recom-

mendations of the National Institute of Industrial Psychology successful in 84 percent of the cases as contrasted with 39 percent success among those who went counter to recommendations. F. M. Earle's more extensive study of 600 experimental pupils and 600 controls may be summarized as follows:

SUMMARY OF EARLE'S STUDY

	Work Same as Recommendation		Work Different from Recommendation	
	Experimental	Control	Experimental	Control
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Average remaining on same job since leaving school	41	32	27	26
Employees rate as high quality	18	15	3	6
Children well satisfied	28	16	11	0

In a similar study from Australia Mirk reported 92 percent satisfactory if in accord with advice, against only 8 percent in other cases. Allen and Smith in the Birmingham experiment (1932) compared guidance with and without tests and found more satisfactory results in a group leaving school that had been given a battery of tests. Trabue used aptitude tests to advantage in the extensive guidance of unemployed adults under the Federal Adjustment Service project.

Probably the attitude of most schoolmen toward aptitude testing has become one of skepticism, despite such results as those just cited. Perhaps the recognition that 'intelligence' is not single, but divisible into uncorrelated factors like verbal ability, arithmetical ability, ability to perceive spatial relations, and conceivably other abilities such as social ability, will lead to a renewed interest in more specific tests. Certainly education is recognizing in its objectives and offerings as never before abilities other than the mastery of formal academic requirements. Tyler's work with the Progressive Education Association, assisting teachers to develop new tests for the particular objectives of their special course, has excellent promise. It is not unlikely that tests of special abilities will have more influence upon education in the next decade or two than will further development of general intelligence tests.

III. PERSONALITY TESTS

1. Their Development

Personality tests date their development from the same decades that gave rise to intelligence testing. Occasional questionnaires on moral knowledge were used during the closing years of the nineteenth century. Jung's famous association test to reveal emotional complexes was published in 1905. The Kent-Rosanoff standardization of that test appeared in 1910, the Woodworth-Wells list in 1911, and the Woodrow-Lowell norms for children in 1916.

The personality test most often used is a questionnaire on symptoms of maladjustment worked out originally by Woodworth. Laird in the Colgate scales (1925) used a graphic scale for responses to similar questions; Thurstone (1930) improved the selection of items; Bernreuter (1931) and Bell (1934) grouped such questions into sub-categories indicative of aspects of adjustment. Rogers (1931) developed some other questions for children out of experience in a child guidance clinic. Maller modified the technique by putting statements on cards to be sorted into two piles: the one for those applicable to the subject, the other for descriptions that do not fit.

Conduct tests began with Voelker's honesty tests in 1921 and experienced their major expansion in the work of Hartshorne and May in the Character Education Inquiry of 1924-29.

Most of the attitude and opinion tests have followed the work of Allport, Bogardus, Moore and Watson, all of whom published studies in 1925, while a major advance in this field came with Thurstone's technique in 1929.

The most widely used vocational-interest test began with Freyd in 1922 and was improved by Strong in 1926. Miner's vocational-interest test dates from the same year. Lehman and Witty published their inquiry into play interests in 1927. Garretson and Symonds gave us an interest blank of special use to schools—one designed to discriminate between the technical, commercial, and academic interests of high-school pupils—in 1930.

The Downey Will-Temperament Test in 1923 opened another avenue of measurement. Jung's distinction between introvert and extravert, Jaensch's integrated and disintegrated personality types, Kroh's extensive- and intensive-attention types, Kretschmer's schizoid and cycloid, came to us from Germany during the republic. Stephenson's work in London with Spearman on perseveration was published in 1932, and

Allport's and Vernon's *Studies in Expressive Movement* came out in 1933.

The Rorschach test—most inclusive of personality indicators—was introduced in 1921 but was ignored by most American psychologists for a decade. Then came a great revival of interest indicated by a summary by Hertz in 1935 of 152 studies related to this one test and the founding in 1936 of a journal, edited by Klopfer, exclusively for Rorschach researchers.³

It is probable that the last five years have brought some swing of psychological interest away from personality-test techniques and toward more emphasis upon the study of personality through ratings, anecdotal records, observation of behavior, and case studies.

2. Their Influence upon Schools and Clinics

The influence upon schools and guidance clinics of this abundant production of personality tests has been slight. At first it was hoped that personality tests (usually of the symptom-questionnaire type) might help to raise the prediction of school achievement over what was possible with intelligence tests alone. Stagner in 1933 reviewed 45 studies of this kind and found the usual result to be that adjustment questionnaires are not significantly correlated with school achievement. The symptom questionnaires have proved useful in giving a certificate of normality to the only child. As Campbell's summary indicates, the only child seems to reveal no particular personality type, either good or poor. It is hard to separate test findings from more inclusive clinical studies of delinquents and behavior problems, but both agree in showing a great deal of insecurity and serious lack of good social adjustment in the home. Some workers have found symptom questionnaires and word-association tests useful in diagnosis, but most psychiatrists and psychological counselors find that the encouragement of the pupil to talk about his real problems is an essential part of therapy, and one best not short-circuited by test questions.

Conduct tests have usefully challenged the common claims for character training in Sunday School, club organizations, camps, and school character-education. The Character Education Inquiry could find little evidence that these agencies were accomplishing in accord with the faith of their leaders. One national agency quite re-made its program after tests revealed that the children longest in the old program were

³Rorschach Research Exchange Secretary, Gladys Tallman, Neurological Institute, Columbia Medical Center, New York City.

most apt to cheat. More recently tests by Clevett, Zyve, Cressman, and Vernon Jones have shown some positive results from the discussion of life problems and the working out of coöperative projects.

Attitude tests have been more encouraging than conduct tests to the claims of educators. The usual finding is that better educated individuals have a more liberal or radical outlook. Correlations between being well-informed and having the liberal slant are typified by Hartmann's r of .41 among teachers, and Wrightstone's .58 among secondary-school pupils. Moore and Garrison found "A" students making 53 percent of the possible radical responses, while "D" scholarship went with making only 4 percent of the possible radical reactions. Both Manley Harper and Heber Harper found graduate study conducive to a more liberal outlook. Cherrington showed how easily speeches or reading assignments influenced student attitudes toward war, but how hard it was to get similar changes among middle-aged adults. Peterson and Thurstone showed that motion pictures may bring large shifts in attitude, but that it is not now possible to predict without testing what effects a given film will have. Biddle demonstrated the possibility of immunizing pupils toward propaganda. Each of these and many other similar studies represent a contribution that might be more widely applied in educational practice.

Differences among individuals in interests, sensitivity, fluidity of experience, attention-type, values, and other aspects of temperament currently studied by psychologists might conceivably call for as much modification of pedagogical approach as should be made for differences in intelligence. The schools have taken up with enthusiasm the phrase, 'the whole child,' but few teachers are now any more cognizant of temperamental differences than teachers in 1900 were cognizant of intellectual differences. Some schools believe that adjustment to differences in mental level is an adequate program of adjustment to individual differences. The emphasis upon intelligence tests—developed even to a profession of mental testing—has filled the whole horizon. Many school administrators are dissatisfied with this one-dimensional approach to the study of individual personality. Their reaction has led them, however, not to temperament tests, but rather to life-histories and case studies. The broader conception of individual differences seems to be coming from the social worker, the psychiatrist, and the psychological counselor equipped to deal with problems of emotional adjustment rather than from the application of test techniques in the field of personality.

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Description of materials, directions, scoring, and some norms for 126 individual tests of language ability, memory, learning, mechanical ability, construction ability, and the like. The section on interpretations is separate and less complete. Bibliography of 319 titles, also a list of publishers of tests.
- (7) EARLE, F. M. *Methods of Choosing a Career*. (G. G. Harrap & Co.: London, 1931, 331 pp.)
Report on efficacy of vocational guidance.
- (8) FREEMAN, F. N. *Mental Tests: Their History, Principles, and Applications*. (Houghton Mifflin: Boston, 1926, 503 pp.)
A general review of the field.
- (9) HARTSHORNE, H. and MAY, N. *Studies in the Nature of Character*. Vol. I. Studies in Deceit. (Macmillan: New York, 1928)

Vol. II. Studies in Service and Self-Control. (Macmillan: New York, 1929, 559 pp.)

Vol. III. Studies in the Organization of Character. (Macmillan: New York, 1930, 503 pp.)

Reports of three years' extensive application by the Character Education Inquiry of ingenious tests of conduct, moral knowledge, and reputation.

- (10) HULL, CLARK L. *Aptitude Testing*. (World Book Co.: Yonkers, 1928, 535 pp.)
Brief summary of previous work; manual for constructing and standardizing additional tests.

- (11) MALLER, J. B. *Character and Personality Tests*. (Teachers College Bureau of Publications, Columbia University: New York, 1937, 137 pp.) Mimeographed and bound.

Description of 356 tests, giving for each: purpose, standardization, costs, and references.

- (12) MURPHY, G., MURPHY, L. B., and NEWCOMB, T. M. *Experimental Social Psychology*. (Harper and Bros.: New York, 1937, 1121 pp.)

This remarkable volume covers a much broader field than that of testing, but it includes excellent summaries of the important investigations on each issue touched upon in this chapter. The bibliography consists of 1111 titles.

- (13) *Nature and Nurture*. (Twenty-Seventh Yearbook of this Society, Parts I and II, 1928)

A number of studies of great significance for the problem of relative weight of variation in heredity and in environment.

- (14) NEWMAN, H. H., FREEMAN, F. N. and HOLZINGER, K. J. *Twins: A Study of Heredity and Environment*. (University of Chicago Press: Chicago, 1937, 369 pp.)

Similarities and differences in pairs of identical twins raised in different environments.

- (15) PATERSON, D. G., ELLIOTT, R. M., ANDERSON, L. D., and Others. *The Minnesota Mechanical Ability Tests*. (University of Minnesota Press: Minneapolis, 1930, 586 pp.)

Summary of previous work, plus the most substantial project in this field.

- (16) PETERSON, JOSEPH. *Early Conceptions and Tests of Intelligence*. (World Book Co.: Yonkers, N. Y., 1925, 320 pp.)

A good historical review of concepts of intelligence, sensory tests, tests of special functions, the development of the Binet-Simon scale.

- (17) PINTNER, R. *Intelligence Testing: Methods and Results*. (Henry Holt: New York, Revised Edition, 1931, 555 pp.)

A general review, with summaries of applications of tests to races, sexes, social groups, school problems, and vocational problems.

- (18) STAGNER, R. *Psychology of Personality*. (McGraw-Hill: New York, 1937, 465 pp.)

Summarizes a number of studies using personality tests and questionnaires.

- (19) TERMAN, L. M. and MERRILL, M. A. *Measuring Intelligence*. (Houghton Mifflin: New York, 1937, 411 pp.)

The latest revision of the Binet individual tests of intelligence, replacing the famous Stanford-Binet described in *The Measurement of Intelligence* by the same author and publisher, issued in 1916.

- (20) WATSON, G. "Tests of personality and character." *Review of Educational Research*, 2: June, 1932, 184-270.

This review mentions about 1000 studies previous to 1931, but lists only the major ones, referring to previous summaries for titles and sources of other articles. The bibliography of 282 titles is organized about tests of abnormalities and symptoms of maladjustment, accuracy, activity, aesthetic response, aggressiveness and submission, appearance, confidence and inferiority, coöperation and negativism, delinquent trends, emotions, excitability expression, happiness, home background, honesty, humor, inhibition, interests, introversion, leadership, maturity, moral knowledge, opinions, originality, perseveration, persistence, physiological indices of personality, ratings, school attitudes, self-appraisal, sex characteristics, sociability, speed, suggestibility, and personality types.

CHAPTER XXXI

THE SPECIFIC TECHNIQUES OF INVESTIGATION: OBSERVATION, QUESTIONNAIRE, AND RATING

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I. OBSERVATION

1. Observation, the Original Technique

It goes almost without saying that observation was the original procedure of all science and must also have been the procedure first used in efforts at objectivity in the study of education. Observation is probably as old as teaching and it would be bootless, therefore, to try to discover the first effort to use it. It would be less difficult to seek out the first effort at systematic observation, the results of which were reported in print, but no one appears yet to have done so. For our purposes it may suffice to mention the early article by Burnham on this topic.¹

The Worcester Normal School students were observing the conduct of children ("in all circumstances,—at home, at school, in the street, at work, at play, in conversation with one another and with adults . . ."), and over 14,000 reports had been made by the date of preparation of the manuscript of the article. More than this, the observations were being systematically, and not randomly, made.²

"Great emphasis is placed upon the necessity of having the records genuine beyond all possibility [of] question; of having them consist of a simple concise statement of what the child does or says, without comment by the writer . . ." Later issues of the *Pedagogical Seminary* published articles based on these observations.

2. The Types of Observation

The development of objective techniques of observation has witnessed a shift from the casual or incidental to the systematic, although, to be sure, much that is termed observation in educational inquiry today is still too informal to be reliable for scientific purposes. The dis-

¹ W. H. Burnham. "The observation of children at the Worcester Normal School." *Pedagogical Seminary*, 1: 1891, 219-224.

² *Ibid.*, p. 219.

tinctions between systematized and unsystematized, or incidental, observation has been tabularly characterized in the book, *Experimental Child Study*, by Goodenough and Anderson.³ A few illustrative characterizations will help to an understanding of the differences. The *nature of the facts to be recorded* in systematized observation is "determined and defined in advance," whereas in unsystematized observation it is "miscellaneous." The *place or situation* in the former is "always recorded," whereas in the latter it is "usually recorded, but in such general descriptive terms as to render classification very difficult." The *manner of making records*, as to terminology, in the former is "uniform, with all terms defined in advance," whereas in the latter it is "loosely descriptive, varying from record to record." The *treatment of results* in the former is "quantitative (statistical)," whereas in the latter it is "qualitative (descriptive)."⁴

Watson⁵ has provided another classification and description of observation that contributes to clarification of the understanding of this technique. He speaks of "observation, with and without instrumental control." He states that by unaided observation "we obtain gross changes in the activities of the individual or the crowd, the general behavior of children and animals, and certain aspects of emotional and instinctive activity." He emphasizes that observation without instrumental control made by a scientist should not be confused with the "amateurish and muddled observation" made by the untrained person, and recalls that some of the finest work in biology, for example, that of Fabre and Wheeler, has been done without instrumentation. It is, however, his opinion that, in general, phenomena "open to unaided observation can be more accurately studied where instrumentation and control of the subject are employed."⁶

3. Observation and Other Techniques

It is in point to call attention to the hazy borderline between observation and a method considered in earlier chapters; namely, experimentation. Observation is often an accompaniment of experimentation and is sometimes identified with it. In passing, it may be

³ Florence L. Goodenough and John E. Anderson. *Experimental Child Study*. (D. Appleton-Century Company: New York, 1931. 546 pp.)

⁴ *Op. cit.*, pp. 128-129.

⁵ John B. Watson. *Psychology from the Standpoint of a Behaviorist*. (J. B. Lippincott Company: Philadelphia, 1919. 439 pp.)

⁶ *Op. cit.*, pp. 25-26.

stated that observation likewise often enters into measurement, is usually employed in the case method, is the source of much evidence secured by questionnaire, and lies back of much of the evidence utilized in documentary analysis. It is, by virtue of its independent use and its employment as an element of other methods and techniques, the most prevalent and important one of all.

4. Observation in Child Study

A chief area of the use of observation, as may readily be inferred from the foregoing paragraphs, is child study. It was true when G. Stanley Hall gave child study its great impetus in this country late in the last century, and it is no less true today. One elaborates the obvious to say that the emphasis is to be expected both because education has been, and is, chiefly concerned with growing children and because their immaturity and inability to interpret themselves make observation, if they are to be studied at all, inevitable. The last ten to fifteen years have witnessed a remarkable spread of the study of children of pre-school age, including infants. A number of important centers of child study have sprung up, of which the Institute of Child Welfare of the University of California, the Child Welfare Research Station of the University of Iowa, the Merill Palmer School of Detroit, the Institute of Child Welfare at the University of Minnesota, and the Clinic of Child Development in Yale University are examples. To be sure, observation is only one of many techniques of investigation applied at these centers, but it is undoubtedly one of the most frequently used.

It would be easy to cite many reports of recent investigations of younger children in which the observational technique was applied, but brief reference will be made to a single typical one, Gesell and Thompson's *Infant Behavior: Its Genesis and Growth*.⁷ This monograph reports and analyzes the results of systematic observation of 107 infants at fifteen age levels from 4 to 56 weeks. Among the means of systematization of observations used were a specially designed observational crib and a one-way screen, and among the aids to accurate observation and interpretation were stenographic records and cinematographs. Illustrations of the twenty-eight aspects of behavior in which growth was investigated in this "normative survey" are postural behavior, sitting behavior, rattle behavior, spoon behavior, mirror behavior, and language behavior.

⁷ Arnold Gesell and Helen Thompson. *Infant Behavior: Its Genesis and Growth*. (McGraw-Hill Book Company, Inc.; New York, 1934. 343 pp.)

5. Observation of Teaching

Another area in which the observational technique has often been employed—and in which frequent employment would be expected—is the teaching act itself. Two needs that have given prominence to observation of teaching are represented (1) in the requirements for observation in programs of teacher training, and (2) in supervision of instruction. While numerous efforts have been made to systematize observations for both needs, most of the observation in this area is still rather hit-and-miss, and only a fragment of the vast total of observation in any school year could be regarded as systematic. Because of the complexities of the problem, an even smaller proportion (if any) could pass muster on exacting scientific criteria. Nevertheless, observation for these ends of training and supervision may be regarded as valuable in practical ways, and the need for reliable techniques and current efforts toward improving them must in time be rewarded by greater success as measured by scientific standards.

A few special types of employing observational techniques in the classroom should be listed. One of these is the time analysis of the use of the class period for various aspects of the teaching process—how much time is used for assignment, recitation, study, etc.⁸ A very different type is represented in the techniques developed by Morrison. By these techniques Morrison undertook to measure “group control,” as indicated by the aggregate pupil-minutes of attention in a given class period, and “sustained application,” as indicated by the proportion of time given to the work in hand during the period by the individual pupil.⁹ A study involving the use of Morrison’s techniques has been reported by Blume.¹⁰

6. Bibliography

No recent special bibliographies on observation as a technique are available. Persons interested in giving further consideration to the

⁸ An instance of this type may be found in Leonard V. Koos and Oliver L. Troxel’s “A comparison of teaching procedures in short and long class periods.” *School Review*, 35: 1927, 340-353.

⁹ Henry C. Morrison. *The Practice of Teaching in the Secondary School*, Chapters VIII-IX. (The University of Chicago Press: Chicago, revised edition, 1931. 688 pp.)

¹⁰ Clarence E. Blume. “Techniques in the measuring of pupil attention.” *Scientific Method in Supervision*, Chapter III (pp. 37-55). The Second Yearbook of the National Conference of Supervisors and Directors of Instruction. (Bureau of Publications, Teachers College, Columbia University: New York, 1929. 308 pp.)

technique will probably be best served by looking up items appearing to bear on it in some such book as Goodenough and Anderson's *Experimental Child Study* to which reference has been made in this section. An extended, yet selected, bibliography on child study will be found on pages 469-500 in that book.

II. THE QUESTIONNAIRE

1. History and Prevalence of Questionnaire Investigation

In the questionnaire we have a technique that is at once often severely condemned and frequently used. Application of this technique to the study of educational problems doubtless antedated the first issue of the *Pedagogical Seminary* (in 1891). However, it is interesting that, as with the technique of observation, an article by William H. Burnham appeared in that issue, which refers to a project involving the questionnaire.¹¹ He states that "with the hope of gaining data for a more definite knowledge of adolescent development," a circular had been sent out from Clark University eighteen months before requesting the coöperation of parents, teachers, and others in collecting material for an anthropological study of adolescence. In the circular it was suggested that information on a number of points in regard to youth of both sexes between the ages of twelve and seventeen would be desirable. The question was directly put as to whether "changes or peculiarities" had been noted concerning sleep, dreams, health, and a dozen other numbered categories. Examination of early volumes of the same periodical reveals a number of other applications of the technique in the study of children and youth.

Since that time the questionnaire technique has been applied in many other areas than child study and it continues in frequent use. Analysis of 581 investigations published ten or more years ago found 143, or almost a fourth of all, to have had questionnaires as the dominant source of data used.¹²

2. The Interview and Ratings as Forms of the Questionnaire Method

The proportion just reported for investigation by questionnaire includes a small number in which (1) the interview and (2) ratings

¹¹ W. H. Burnham. "The study of adolescence." *Pedagogical Seminary*, 1: 1891, 174-195.

¹² Leonard V. Koos. *The Questionnaire in Education: A Critique and Manual*. p. 37. (The Macmillan Company: New York, 1928. 178 pp.)

were used. The propriety of regarding rating as questionnaire procedure will be apparent in the treatment accorded it in a later portion of this chapter.

As for the interview as related to the questionnaire, it may be said that the chief difference between studies by interview and by other questionnaires is that the inquiries by interview are usually put in person and individually, whereas questionnaires are typically, although not always, answered with the investigator absent. It is significant in this connection that Charters refers to the interview as the "oral questionnaire" and compares it with the "written questionnaire."¹³ Support for the contention that the interview is a questionnaire technique is supplied by some of the practices in applying it. For example, in a survey of play activities of children a form used as a written questionnaire by children in Grade III and above—that is, by pupils who were able to read it—was used as an interview form by teachers with pupils in the grades below. In another investigation into certain aspects of business management of schools, a form that was used in interviews was later mailed to be filled out as a questionnaire by a large number of respondents.

The interview is usually held to possess advantages over the questionnaire used without personal contact. Although the claim is in most cases justified, exceptions may be found in which written response is the more reliable, particularly in instances where the answers might reflect unfavorably on the respondent.

Classifiable, of course, as 'questionnaire investigations' are all those that merely replace the term 'questionnaire' by some other. Among these are 'schedule,' as used in such an investigation as that conducted by the Committee on Revision of Standards of the North Central Association of Colleges and Secondary Schools, 'inquiry form,' as used in most of the projects of the National Survey of Secondary Education, and 'check list,' as applied in a number of studies that involve sending out blanks to prospective respondents.

3. Areas of Use of the Questionnaire

The study previously mentioned¹⁴ showed that the questionnaire was more often resorted to in certain fields of education than in others. The two areas with the largest proportionate use were administration

¹³ W. W. Charters. *Curriculum Construction*, p. 134. (The Macmillan Company: New York, 1923)

¹⁴ Koos, *loc. cit.*

and curriculum. To some extent, but less often, it was applied to problems in methods of teaching, where experimentation is much more appropriate; to problems in tests and measurements; and to problems in educational psychology. Mention should be made also of the frequent use of the questionnaire as a component of that composite procedure, the educational survey. Specific evidence on this point has been supplied by Eells, in his analysis of procedures used in a large number of surveys of higher institutions. He found that 42 percent of these surveys had made use of questionnaires. He goes on to say, "Doubtless these were used in others [of the surveys] although not specifically mentioned."¹⁵ The questionnaire is exceeded in frequency of use by only two other techniques, namely, 'personal visitation' (69 percent) and 'analysis of existing data' (63 percent). The percentage reported for questionnaires does not include interviews, which Eells reports separately as 'interviews and conferences' (35 percent).

4. Some Valuable Studies Made by Use of the Questionnaire

Not only has the questionnaire technique been used frequently in educational investigation, but it has also yielded some studies and reports of acknowledged merit, some of them outstanding. As a reminder of the possibilities of the technique, it may be desirable to list a few of the better ones. The list may be prefaced by mention of the federal Census, which, although not an educational investigation, is one of the nation's most efficient, large-scale investigations by interview. Among the better reports of educational investigations almost wholly by questionnaire (or interview) are Charters and Whitley's study of the duties and traits of secretaries¹⁶ and Counts's inquiry into the socio-economic status of high-school pupils.¹⁷ Among important large-scale investigations that depended in large part, even if not entirely, on returns from questionnaires are the Committee on Revision of Standards of the North Central Association of Colleges and Secondary Schools, the National Survey of Secondary Education, and the National Survey of Teacher Education.

¹⁵ Walter Crosby Eells. *Surveys of American Higher Education*, p. 113. (The Carnegie Foundation for the Advancement of Teaching: New York, 1937. 538 pp.)

¹⁶ W. W. Charters. *Summary of Report on Analysis of Secretarial Duties and Traits*. (The National Junior Personnel Service, Inc.: New York, 1924. 62 pp.)

¹⁷ George S. Counts. *Selective Character of American Secondary Education*. (Supplementary Educational Monograph, No. 19. The University of Chicago: Chicago, 1922. 162 pp.)

5. Admonitions to Persons Contemplating the Making of Questionnaire Investigations

Reference was made at the outset of this discussion of the questionnaire to the fact that as a technique it is often severely condemned. In no small part this unfavorable attitude is justified by the frequent misuse of the technique. Both the respect for questionnaire investigations and their merit would be increased if persons who contemplate making them would give more consideration to admonitions derived from analysis of a large number of studies by questionnaire and experience in the making of such studies. Following is a partial list of such admonitions not already expressed or implicit in the foregoing discussion.¹⁸

(1) The technique should be used only when there is no other feasible means of securing the information required. (2) Great care should be taken in the preparation of the questionnaire form. (3) The questionnaire as a whole and each specific inquiry in it should be subjected to the two working criteria of the *ability* and the *willingness* of the person approached to respond. (4) Responses or entries required on the form should be of as simple types as possible. (5) The questionnaire form should be mechanically adequate. (6) It should be as short as possible. (7) It should be sent to persons in the best position to make reliable responses. (8) It will be necessary, when there is danger that a failure to respond is prompted by some factor of selection, to strive for a full count or practically full count of responses.

6. The Vocational-Interest Blank

Any treatment of the questionnaire should recognize two types, which, though of recent development, are of considerable promise, and even of some demonstrated utility, in guidance. Reference is made here to certain work-interest or vocational-interest blanks and to devices for measuring personal adjustment.

The nature of the vocational-interest blanks may be suggested by describing one devised by Edward K. Strong, Jr. This blank consists of eight parts headed "Occupations," "Amusements," "School Subjects," "Activities," "Peculiarities of People," "Order of Preference of Activities," "Comparison of Interest between Two Items," and "Rating of Present Abilities and Characteristics." The respondent is directed to circle a letter following each occupation to indicate his attitude toward that occupation: by circling 'L' he indicates that he likes

¹⁸ Based on Koos, *op. cit.*, pp. 159-167.

it, by circling 'I,' that he is indifferent to it, by circling 'D,' that he dislikes it. There are other sections of the blank into which we need not go here.

Bingham, in appraisal of the Strong blank, states that it "is the most dependable means available for ascertaining the similarity between a person's interests and those of people actually engaged in specified occupations on the professional level."¹⁹ The blank is most useful with persons at least 17 years old and has been used chiefly at the collegiate level.

Another similar blank, Miner's "Analysis of Work Interests," is referred to by Bingham as "one of the best questionnaires" for "stimulating thoughtful consideration of interests by suggesting how to observe one's own likes and dislikes,"²⁰ and as particularly suitable for use with high-school pupils. In final appraisal of interest blanks as a group, Bingham has the following to say:²¹

For the counselor, interest inventories and the scores they yield are of assistance in focussing attention on the problem, furnishing points of discussion in the vocational interview, and indicating specific needs for further experience as a basis for making in the future more dependable appraisals of the person's real interests.

7. Measuring Personality Adjustment by Questionnaire

Several questionnaires have been devised to measure the 'adjustment' of pupils. One of these, called an "adjustment questionnaire," was originated by Symonds and Jackson.²² The form consists of seven sections dealing with adjustment in relation to (1) curriculum, (2) social life of the school, (3) the administration, (4) teachers, (5) other pupils, (6) home and family, and (7) personal affairs. All items are put in the form of questions requiring *yes* or *no* for answer. Of these questions, the following are samples: "Do you ever worry for fear you will not pass in school?" "Do you dislike any of your teachers?" "Are you popular with other students?" On the basis of considerable statistical evaluation it is the authors' opinion that the questionnaire de-

¹⁹ Walter V. Bingham. *Aptitudes and Aptitude Testing*, p. 72. (Harper and Brothers: New York, 1937. 390 pp.)

²⁰ Bingham, *Op. cit.*

²¹ Bingham, *Op. cit.*, 82.

²² Percival M. Symonds, in collaboration with Claude E. Jackson. *Measurement of the Personality Adjustments of High-School Pupils*. (Bureau of Publications, Teachers College, Columbia University: New York, 1935. 110 pp.)

scribed "proves a valid and reliable measure." Of this and another questionnaire of related purpose the authors say further,²³

The instruments are essentially survey instruments, helping the teacher and counselor to recognize the adjusted and the maladjusted and particularly to spot problem pupils or pupils with problems. These instruments possess only limited diagnostic value. Anyone wishing to *understand* a problem pupil or a pupil with problems must make a much more intensive case study, using principally as a technique the personal interview.

8. An Attempt to Measure Intelligence by Interview

No effort at indicating the possibilities of the questionnaire in educational investigation would be quite complete without at least brief reference to a recent, renewed attempt to administer a disguised test of intelligence by interview. An earlier effort by Snedden to disguise an intelligence test as an interview on heredity was, on his own admission, not successful because it was "too artificial."²⁴ Maizlish, in the new effort,²⁵ revised the Snedden test into an individual and a group form of a "Likes and Dislikes Questionnaire." It actually turns out to be a type of vocabulary test. Among "possible uses" of the procedure listed by the investigator are (1) by social agencies to test persons who are about to adopt children; (2) by the psychiatrist or social worker to test the parent of a delinquent child; and (3) by employing officers, with different words to fit special fields of employment, to ascertain applicants' familiarity "with the current terminology in a field which requires preliminary knowledge and training."²⁶ This attempt at least hints at the tenuous character of the boundary that separates intelligence and achievement testing from the questionnaire.

9. Bibliography

Persons who wish to read further on the subject of the questionnaire technique will find a list of references on it on pp. 47-49 in *The Questionnaire*, Research Bulletin of the National Education Association, Vol. VIII, No. 1, published in January, 1930. Another list will be found

²³ *Op. cit.*, p. 105.

²⁴ Donald Scott Snedden. *A Study in Disguised Intelligence Tests*. Interview Form. (Teachers College, Columbia University, Contributions to Education, No. 291: New York, 1927)

²⁵ I. L. Maizlish. "New possibilities in intelligence testing, interview form." *Journal of Applied Psychology*, 20: 1936, 599-608.

²⁶ *Loc. cit.*, pp. 607-608.

on pp. 168-174 in Koos's *The Questionnaire in Education*, which has been referred to in the foregoing treatment.

III. RATING

1. The Development of Rating

The presence of adjectives, particularly adjectives indicating comparison and differing degrees of qualities, is evidence that rating is as old as language. However, the systematization of rating is a relatively recent development. Symonds believes that the first scale of items by which judgments might be made was that described by Galton in 1883 in a section on mental imagery in his *Inquiry into Human Faculty and Its Development*. The most rapid development of techniques of rating in education appears to have followed closely on the heels of the recent movement for objective measurement, and the devices have been invented and applied chiefly to phases and problems of education less tangible than those reached by objective measurement.

We now have scales, score cards, and other rating devices in wide variety as concerns the type of phenomena they purport to measure, among them diverse traits and the behavior of pupils, teachers and teaching, textbooks, buildings, homes, and neighborhoods.²⁷ Scales for the measurement of performance in composition, handwriting, art, and other school subjects have a great deal in common with the devices already listed; they are properly considered in other portions of this Yearbook (especially Chapters VI to XV and XXIX).

The value and need of rating is suggested in a brief statement by Knight.²⁸

One person's opinion of another is a most useful instrument in the work of selecting employees or in making decisions concerning the promotion or dismissal of a worker. Until objective tests of performance, ability, character, temperament have been so developed and refined that our present tests are but historic curiosities in comparison, personal estimates in one form or another must be used.

²⁷ On score cards, see C. R. Maxwell, "The use of score cards in evaluating textbooks," *The Textbook in American Education*, Chapter VIII in the Thirtieth Yearbook, Part II, of this Society, 1931.

On the rating of teachers, see the important and influential early contribution of Arthur C. Boyce. *Methods for Measuring Teachers' Efficiency*. The Fourteenth Yearbook, Part II, of this Society, 1915.—*Editor*.

²⁸ F. B. Knight. "The effect of the 'acquaintance factor' upon personal judgments." *Journal of Educational Psychology*, 14: 1923, 129.

2. The Graphic Rating Scale

The type of scale that has gained great favor in recent years is the one known as the 'graphic rating scale.' The form in which it usually appears is as a series of descriptive terms or statements arranged below a horizontal line on which the person rendering judgment places a check-mark against the term or statement he regards as most applicable. The following two excerpts from a scale will serve to illustrate:

3. Does he appear neat or slovenly in his dress?

Extremely neat and clean. Al- most a dude.	Appropriately and neatly dressed.	Inconspic- uous in dress.	Somewhat careless in his dress.	Very slovenly and unkempt.
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18. Is he quiet or talkative?

Talks seldom. When ques- tioned answers briefly.	Does not uphold his end of the conversation.	Moderately talkative.	More than upholds his end of the conversation.	Great talker. Always going.
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For scoring, numerical values are assigned to each characterization, and the score is usually derived by adding the numerical values checked by the rater.

According to Freyd, the graphic rating scale has the following general advantages.²⁹ (1) It is simple and easily grasped. (2) It is interesting and requires little motivation of the rater. (3) It is quickly filled out. (4) It is simply and easily scored. (5) It frees the rater from direct quantitative terms. (6) It enables the rater, nevertheless, to make his discrimination as fine as he cares . . . (7) It is universal; that is, no master scale is required as in the Army Scale . . . (8) It allows of comparable ratings without requiring each rater to know all the members of the group.

Freyd points out further that the scale yields a close relationship between ratings on the same subjects by the same rater for different periods and between ratings on the same subjects by different raters. In other words, the graphic rating scale has been shown to have high reliability. It has not, however, been possible to evaluate the scales adequately, for, if a method of objectively measuring a given trait were

²⁹ Max Freyd. "The graphic rating scale." *Journal of Educational Psychology*, 14: 1923, 94.

available, a rating scale would not be needed.³⁰ However, in our subsequent description of an investigation by Olson involving a rating scale, it will be shown that it was possible for him to attain something approaching satisfactory validation.

Certain investigators have indicated a preference for the ranking method as compared with the graphic rating scale, especially as ranking involves a 'man-to-man,' 'pupil-to-pupil,' or 'teacher-to-teacher' comparison. Symonds has presented evidence bearing on the issue.³¹ His investigation concerned both traits and habits of pupils in Grade VII. He found that "the two methods give nearly identical results" and calls attention to the greater ease in use of the scale. When the group is large, the ranking method is cumbersome and confusing.

3. Toward More Reliable Ratings

In the article by Knight already referred to, published in 1923, he summarized the improvements in rating that had been made in the few years immediately preceding.³²

The main lines of improvement were:

1. Increasing the value of estimates by increasing the number of judges.
2. Determining the reliability of the estimate by proper statistical treatment of the judgments.
3. Directing the judgments through forcing the judges to make more analyzed estimates by listing specific traits to be judged.
4. Clarifying the meaning of adjectives, such as 'honest,' 'hard-working,' etc., by many devices . . .
5. Bringing to light several errors in rating schemes which must be reckoned with in a sophisticated interpretation of the ratings.

One is moved to mention that the graphic rating scale, which has had its greatest development since the date of Knight's writing, has helped to accentuate certain of the improvements he lists—in particular, improvements indicated in the third and fourth items.

In elaboration of this summary of improvements one may mention the concern over 'halo' effect in ratings; that is, the tendency of the judge to be influenced in his ratings on the specific traits of an indi-

³⁰ Freyd, *loc. cit.*, p. 89.

³¹ Pervical M. Symonds. "Notes on ratings." *Journal of Applied Psychology*, 9: 1925, 188-95.

³² *Loc. cit.*, p. 129.

vidual by a general attitude toward that individual. "If the judge likes the person, he rates him high in everything; if he dislikes him, he rates him low in everything."³³ Harmonious with this inference are Knight's finding that the "factor of Acquaintance . . . operates to make ratings more lenient; that is, increases the over-rating, and to make ratings less critical and less analytical; that is, increases the influence of the halo of general estimate,"³⁴ and also Shen's conclusion that "there seems to be a consistent relation between friendship and a tendency toward over-estimation."³⁵ Progress in correction for this tendency would seem to be encouraged by devices in rating that stimulate a more analytical approach.

Our treatment of rating will be concluded with brief descriptions of two projects involving the ratings in two important educational areas, one in measuring children's behavior and the other in predicting teaching success.

4. A Project Involving Use of a Behavior Rating Scale

The first of these involves the use of a graphic behavior rating scale and is the work of Olson.³⁶

In this project the scale, Schedule B, consisted of thirty-seven intellectual, physical, social, and emotional traits. Records of another schedule, A, were available for the same group of children as records on Schedule B. Schedule A was designed to locate problem children through a record of overt behavior problems as reported by teachers. The nature of Schedule A makes it possible to regard the scores on it as a sort of criterion for what the behavior-rating scale, Schedule B, undertakes to measure.

Three methods were used to determine the reliability of ratings secured with Schedule B, namely, (1) correlation between repeated ratings, (2) correlation between halves of the scale, and (3) correlation between multiple ratings by different judges (teachers). Reliability coefficients were high for the first and second methods (.86 and .92), but not so high for the multiple ratings.

Efforts to ascertain the validity of the scale involved correlating the scores on Schedules A and B, clinical validation on cases referred to the Child Guidance Clinic, and a study of subsequent history of the pupils rated. The outcomes of validation, according to Olson, were:³⁷

³³ Freyd, *loc. cit.*, p. 91.

³⁴ Knight, *loc. cit.*, p. 142.

³⁵ Eugen Shen. "The influence of friendship upon personal ratings." *Journal of Applied Psychology*, 9: 1925, 68.

³⁶ Willard C. Olson. *Problem Tendencies in Children: A Method for Their Measurement and Description*. (The University of Minnesota Press: Minneapolis, 1930. 92 pp.)

³⁷ Olson, *op. cit.*, pp. 42-43.

Schedules A and B measure the same function to the extent of an uncorrected validity coefficient of about .62 (.73 when corrected for attenuation). Clinical validation of the scale revealed that the cases referred to the Child Guidance Clinic are differentiated from the general school population in a significant manner. Variations within the clinical group offer further evidence for the validity of the device. A study of the subsequent history of pupils rated offers suggestive evidence on the validity of the scales employed in studying behavior problems and problem tendencies.

Outcomes of such a study suggest real usefulness for graphic rating scales devised to measure behavior.

5. The Graphic Rating Method Applied to Predicting Success in Teaching

Effectiveness of teaching is so obviously paramount that a host of attempts have been made to measure and to predict it. Many of these attempts have involved the technique of rating, although most of them by loose and slipshod procedures. No attempt at rating, even with a graphic scale, has yet been crowned with notable success; but it seems desirable, nevertheless, to describe and report the outcomes of one of the better studies, both to illustrate the limitations of present accomplishments and to hint at what must still be done.

The project taken as an illustration is one by Tiegs.³⁸

The portions of the whole project of chief concern here is a 'twelve-point' blank in the nature of a graphic rating scale, the reliability of this blank, and the coefficient of correlation between ratings of fifty teachers on this blank and the criterion of success as teachers. This criterion was derived from a composite of ratings (not graphic) by supervisors, principals, and the assistant superintendent. The blank used for this rating consisted of thirteen points on which the teacher might receive ratings of 'Excellent,' 'Good,' 'Fair,' or 'Poor.' Numerical values were assigned to these ratings, totals computed, and ranks assigned to the teachers as determined by the totals. The rank constituted the criterion.

The reliability of the twelve-point blank is indicated by the coefficient, which was .79. The correlation between predictions and criterion was —.21, which indicates that this method of prediction, if the criterion is acceptable, is devoid of merit. To be sure, some question might be raised concerning the acceptability of the criterion.

³⁸ Ernest W. Tiegs. *An Evaluation of Some Techniques of Teacher Selection.* (Public School Publishing Co.: Bloomington, Illinois, 1928. 108 pp.)

6. Bibliographies

A short bibliography containing a number of items on personal rating will be found at the end of the chapter on "The Measurement of Conduct" in Symonds's *Measurement in Secondary Education*, to which reference has been made in this section. The items are listed on pp. 361-362. The monograph by Tiegs that has just been drawn upon contains (pp. 80-81) references on the rating of teachers.

IV. THE INTERRELATIONSHIPS AND SIGNIFICANCE OF THE THREE TECHNIQUES

In view of the foregoing discussion of the three techniques of observation, questionnaire, and rating, it may be concluded that they bear important relationships to each other. Without observation, both the questionnaire (including the interview) and rating would be impossible. Also, rating may appropriately be thought of as merely a variant of the questionnaire. Attention has been directed, moreover, to the dependence on observation of experimentation and measurement, to the fact that observation underlies the confidence we have in documentary analysis, and to the tenuous character of the boundary between the measurement of intelligence and achievement on the one hand and the questionnaire on the other hand.

In assessing the significance of the three techniques it is apparent that, because of applications in its own right and as an element in other techniques and procedures, observation is the most pervasive and indispensable of them all. Two of the major areas in which it has been and is being currently applied are child study and teaching.

The questionnaire, while not regarded as equally reliable, is often used because unavoidable. Where it has been applied with full awareness of its limitations, it has yielded some notable studies. Special areas of current promise for this technique are work-interest blanks and the adjustment questionnaire.

Applications of the technique of rating, also, are yielding valuable results, more especially in areas that for the time being are less susceptible than others to objective measurement. Two areas in which this technique has more recently been emphasized are in the rating of traits and behavior and of teachers and teaching, with more encouraging outcomes for the measurement of traits and behavior, but not without some assurance for the other important area.

SECTION III

THE CONTRIBUTIONS TO EDUCATION OF SCIENTIFIC
KNOWLEDGE IN PARTICULAR FIELDS

CHAPTER XXXII

CONTRIBUTIONS TO EDUCATION OF SCIENTIFIC KNOWLEDGE ABOUT THE PSYCHOLOGY OF LEARNING

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I. EDUCATION AS GUIDED HABIT-FORMING

Education is guided learning. Learning, in turn, is habit-forming, if taken generally enough; for even when in a particular case the aim is not that of forging some mode of thinking or acting that will operate always in a fixed way thereafter but is that of developing a more general attitude—that of independent inquiry, say, or that of making a student resourceful in solving ‘originals’—even then the teacher’s regard is toward the learner’s future, and he hopes that the present activity will set up in the learner an abiding tendency of some sort. Education is guided habit-forming.

II. THE STRUCTURE OF A HABIT

Within the time of the present generation and up until very recent years there flourished a beautifully over-simplified notion of what we mean by the word ‘habit.’ It is well illustrated by a classic experiment on the white rat, by Watson in 1907. In order to determine which of the sensory functions of that animal are finally essential to its learning to thread its way successfully through a complicated maze, he tested in the maze blind rats, deaf rats, rats with olfactory bulbs removed, and rats minus their vibrissae and with anesthetized feet. In each case the animals showed much the same capacity to learn as did normal animals, and by the logical process of elimination Watson concluded that only the kinesthetic stimulations arising from the animals own moving muscles (also possibly the organic) were necessary for the building up

of a particular maze-running habit. And this apparent logical outcome bolstered the theory that what a habit essentially consists of is a *chain of movement-aroused reflexes*. When a man makes the first responses of a learned act, the very moving of the muscles and joints involved sets up sensory nerve currents that arouse the next responses; the currents from these arouse the next; and so on. A complicated performance—be it reciting a passage from Virgil or repeating the multiplication table or playing a Chopin nocturne—becomes a well-integrated habit to the degree that successive sensori-motor units become welded into a definite, unvarying sequence of little acts.

But more recent experimental work by many (Gengerelli, Dennis, Hunter, Lashley, Macfarlane, Dashiell, and others) has exhibited the untenable nature of such an extreme view. Animals can be trained to take, say, a left-hand instead of a right-hand turn regardless of the length of the avenue of approach to the turn and of any new elbows in it. Once trained to run without error in an ordinary maze, they will swim the same maze without error if it be immersed; or again, if after the learning they be so operated that they can progress only by rolling and tumbling they will continue to negotiate the turns correctly. If given opportunity to take diverse routes to the same food-goal, they will oftentimes follow new alternative routes without making any turns in a wrong direction. In short, it has become clear that we need not go higher than subhuman species to observe that an organized habit is something vastly more than a chain of reflex arcs joined by the cement of kinesthetic impulses. *Any well-learned performance remains a variable and adaptable performance.*

III. THE TRIAL-AND-ERROR PRINCIPLE

In the late nineteenth century, Lloyd-Morgan had invoked the principle of trial-and-error as the explanation of habit forming—"varied trial and error with the utilization of chance success." This conception was then given powerful support by Thorndike's well-known experimental studies on dogs and cats. His method was to put animals when hungry in enclosures from which they could escape by some simple act, such as pulling at a loop of cord or stepping on a platform. The animal was put in the enclosure, food was left outside in sight, and his actions observed. At first the animal's behavior was decidedly random, consisting of mewings or barkings, scratchings, bitings, sniffing here and there, looking here and there, with no evidence of any system or directness.

Sooner or later, however, he chanced to hit upon the particular movement that secured his release; then, in the course of retrials on the same problem, he came somehow to make the 'successful' movements more and more promptly, until at last the definite habit would be set up of going directly to the lever or other crucial object. Thorndike's work fashioned the mold in which the experimental studies of animal learning were to be cast for the next twenty-five years.

Many are the experiments in human psychology (by Bryan and Harter, Book, Starch, Bair, Batson, Chapman, Snoddy, Barnes, and others) leading to similar conclusions. I need mention only that of Swift in which he studied the progress of learning the juggler's act of keeping two balls in the air. He made the significant observation that a more effective technique in the handling of the balls was often hit upon without the learner's being aware of the fact until he came to realize later that he had unconsciously adopted and established the new trick of throwing or of catching. Certainly it resulted from no analytic perception of just what to do or just how to improve.

In consequence of experimental reports like these, the orthodox view of habit-forming, in human as in subhuman forms, leaned to an extreme emphasis upon the *random*, *hit-or-miss*, *trial-and-error*, *unanalytic* character of the learning.

IV. THE PRINCIPLE OF INSIGHT

Within the last ten years a reaction has clearly set in. Adams, for example, repeated the Thorndike type of experiment, but with results that have to be interpreted differently. A cat placed in an enclosure appeared at no time to scramble about and claw indiscriminately; and in the course of 31 trials he found his way out, not by one stereotyped movement he had hit on, but by pulling the proper string in no fewer than ten different manners, pulling at it in widely different places and variously with teeth, chin, or paw. Maier, after familiarizing a rat with a table top and also, but separately, with an elevated maze pathway, then placed the animal upon the table with its food behind a barrier but approachable by the roundabout maze pathway. After a short period of vain explorations on the table, the typical rat would suddenly face about, apparently seek out the maze entrance and promptly run this long-way-round to the food. It was, therefore, concluded that this animal can combine the essential elements of two different experiences in a novel and adjustive fashion to reach an objective.

Most famous are the researches on apes of Köhler, Yerkes, Bingham, and others, which are so well known that a single sample will suffice. A chimpanzee, on finding a banana suspended from the roof at a point quite out of his reach, would be seen to make all sorts of ineffectual efforts to obtain it, jumping, running about, throwing objects at the banana, and climbing up and down over boxes left lying about. But at length, while touching a box he would hesitate, his movements would become slower; and then with eyes upon the food he would push his box over under it and mount to a point from which he could pull it down. In a word, then, the ape will solve a problematic situation, not by the method of repeated blind trials with the gradual selection of the successful movements in a manner not necessarily involving any attention thereto, but by the method of *attentive scrutiny of the field and a perceiving of certain crucial relationships* within it.

This technique of Köhler's has been applied in America to learning by human infants and children and by defectives (Alpert, Matheson, Aldrich and Doll, and others); and the observations obtained on these subjects are consistent with those of Köhler. They are quite consistent also with other studies of analytical learning by human subjects.

In general, then, it must nowadays be recognized that a habit is acquired in man and in many brutes not always by blind hyperactivity with occasional chancing upon adequate movements and then a slow process of unconscious selecting and fixating of these lucky movements; instead it is often a display of intelligent insights.

Experimental studies of insightful learning have often been called studies in 'problem-solving,' and the term is a happy one. Immediately we see the relevance to many forms of educative training. 'Originals' in arithmetic, algebra, geometry, and physics are to be contrasted with the drill work of learning the multiplication table or the spelling of important words. So, too, with the 'thought questions' in civics, in literature, and in many other studies; the learning task then set the child is not that of fixing by repetition a given mode of speaking, writing, or acting, but that of bringing his resources and his experience—his stock of habits—to bear on a difficulty that is new to him in some ways; and he is forced to make some analytic examination of it to see whether he can discern the crucial relationships that obtain. More generally, we may say that a fundamental assumption of present-day education is that the child is learning in the truest sense when he is achieving new insights.

V. THE PRINCIPLE OF CONDITIONED RESPONSE

During the last fifteen years or so much attention has been given in the experimental laboratories to the phenomenon of the 'conditioned response.' The observations and claims of Pavlov and of Bekhterev have been subjected to increasingly detailed experimental examination and, with scarcely an exception, verified. Those Russian workers had found that a dog could be trained to salivate or a man to jerk back his foot involuntarily upon the reception of any stimulation, however seemingly irrelevant, if only it be frequently accompanied or closely followed by a stimulation that was already effective. Thus there reappeared the centuries-old principle of learning by association, but now clothed in garments of high biological respectability. Many particular detailed principles contained in the phenomena of conditioning were unravelled by Pavlov's genius—conditioned inhibition, differentiation, irradiation, and several others—and the bulk of experimental work since has been devoted to their successful verification (by Hull, Hilgard, Marquis, Bernstein, Garvey, Jones, Switzer, Wolfe, Razran, Skinner, and others).

On the interpretative side, however, the views of Pavlov seemed not to have been fairly grasped until of late. It had been supposed by many (a) that conditioning was an ultra-simple process in which one specific stimulus was substituted for another specific stimulus or one specific motor response substituted for another specific motor response; and (b) that this substituting occurred in an impersonal, mechanical manner that might be ever so remote from what the man or animal might be interested in at the time—might be, in other words, unmotivated. But certain lines of experimentation (by Liddell, especially, also Hull, Zener, *et al.*) have led to a rereading of Pavlov, a rereading that has supported broader interpretations; and nowadays the two assumptions just mentioned would be considered naïve, because (a) the phenomenon of stimulus-substitution (or response-substitution) is one that originally involves almost the whole organism and only gradually becomes localized, and (b) it occurs only when the organism is in an alert condition, and its behavior from first to last reveals needs and tensions that seek relief.

From the practical angle two points may be mentioned. First, the conditioned response has thrown into a sound biological perspective the simpler instances in which the student-pupil acquires a new stimulus-response, as when he comes to say 'cat' when seeing that word printed

on a card. Second, it has become even more fruitful in furnishing a key to those peculiarities in one's emotional make-up in which how one feels about a thing or a person or an idea seems utterly inappropriate and irrational. The early work of Watson in exhibiting how a senseless fear can be implanted in a child by conditioning, and again how it can be eliminated by conditioning, has had extensive influence in the fields of mental hygiene. For example, an unreasoning phobia for the sound of church bells or for the sight of a locomotive has become understandable enough if we see its genesis in some intense or repeated experience of the child when bell-ringing or when a locomotive were incidental accompaniments of a situation in which a child experienced pronounced fear or dread of some other and entirely adequate incident or factor.

VI. THE RÔLE OF REWARD AND PUNISHMENT

It has been implied in a preceding paragraph that contemporary research appears to demonstrate that a person or animal will form a new habit, even on the level of the conditioned response, only if in some way he is motivated. But 'being motivated' is an ambiguous term; for it may refer to the guidance of learning by incidental pleasures and pains, or to the general energizing of the learner, or to the part played by his interest in some objective goal.

The pleasure-pain doctrine is of ancient vintage, but its modern psychological form makes more modest claims than did its ethical and economic predecessors. The scientific problem of recent times, by contrast, is: What part do the incidental pleasantnesses and unpleasantnesses (or rewards and punishments), play in the directing of learning? The Law of Effect, advanced in the 90's by Thorndike, held that satisfying (agreeable, pleasant) results tend to repetition of the act producing them, while annoying (disagreeable, unpleasant) results tend to omission of the act. The law was thus a supplement to the trial-and-error description of learning. This well-known law has, however, been repeatedly challenged. How can the result of an act, runs one query, work in backward direction upon the act itself? Or, runs another, how can the mere conscious awareness of pleasantness or of unpleasantness affect a physical process?

Experimental inquiries have taken different forms. A recent one is that in which a person learns on a punch board or a stylus maze to make the correct punch or correct turn at each of some thirty choices arranged in irregular serial order (see, for instance, studies by Tolman,

Hall and Bretnall, Muenzinger, Crafts and Gilbert, Bunch, Hulin and Katz). In different experiments the right responses were variously accompanied by no signal, by buzzer, or by shock; and the accompaniments of wrong responses were equally varied. One general outcome is that the attaching of physical punishment to a wrong response is no more effective than attaching it to a right one; nor is it any more effective in either case than attaching a sound signal. Accordingly, the idea has been advanced (a) that punishment has little if any direct guiding (eliminative) value in its own right, (b) that it is valuable only because it is informative, or (c) because it speeds up or energizes the person generally. It must be noted also that if the punishment be too severe, it is likely to disrupt the whole process of learning.

Meanwhile Thorndike has been repeatedly demonstrating with simple experimental materials that rewards do lead somehow to the repetition of the response rewarded, even though punishment seems to have no value.

It may be added that the other classic 'secondary laws' of associative learning—frequency, recency, primacy—have not been shown to be important.

VII. THE IMPORTANCE OF THE GOAL-SEEKING ATTITUDE

What is to be made of the relative insignificance of incidental rewards and punishments as directors of learning, especially with human beings? Recall that either a reward or a punishment may, if attached to a right response, serve very well for the fixing of that response; clearly it gets its importance not from its own intrinsic character but from its serving as a helpful cue to the learner in obtaining his more ultimate objective. There is eloquent testimony, then, in the experiments referred to in the section just preceding, that one cardinal ingredient in a learning process is that the learner is pursuing some objective, is goal-seeking. This is the central and emphatic contention of the more active members of the original Gestalt school, as well as of others not to be so identified. Experiments on children, apes, and other species (Köhler, Yerkes, Bingham, Lewin, Alpert, Matheson, MacDougall, Wheeler, and many others) have been built around the motivation of the subjects toward some objectives—a banana or a toy hung vertically out of reach or laid beyond the cage bars too far to be grasped, so that the subject can obtain it only by adopting some more or less original way of laying hold of it.

In some of the animal laboratories this motivational phase of learning has been analyzed (by Tolman, Honzig, Elliott, Blodgett, Williams, Leeper, and others) into the external 'incentive' and the internal 'drive'; and the presence of both of them has been proved to be distinctly more effective than the presence of only one, while the absence of both has been attended, for the most part, by no learning.

These results of these experimental investigations reinforce an educational doctrine that has been preached ever since Froebel; namely, the view that enlightened teaching looks upon the pupil-student neither (a) as a passive absorber, nor (b) as a reactive marionette, nor (c) as a machine equipped with propeller but no rudder, but instead (d) as a desiring, seeking, interested biological organism who will learn best when provided with objectives.

VIII. PRINCIPLES OF ECONOMY IN LEARNING

Ebbinghaus, in his pioneer experimental study of memorizing in the 80's, brought to light several helpful principles on how to learn. They include such well-known points as that it is more effective to *distribute* practice over separate intervals than to try to learn completely at one sitting; that *meaningful* material is more easily memorized than rote; that attempts actively to *reproduce* what one is memorizing are highly helpful; that to strike a *rhythm* in the reading or the repeating is often of value; and the like. All the foregoing have been abundantly substantiated in the volumes of findings by other experimenters (Müller, Meumann, Reed, Pyle, Winch, the McGeochs, and a great many others); but one of Ebbinghaus' practical principles continues to be challenged, namely, that learning a thing *as a whole* is more effective than learning it piecemeal. This has turned out to be true only under such special circumstances that it no longer deserves recognition as a general law (Pechstein, Reed, W. Brown). Many sorts of modifications of the whole-part principles are to be recommended—more, indeed, than we have room to enumerate.

IX. TRANSFER OF TRAINING

The pioneer clearing in this field by Thorndike and Woodworth has been greatly extended (Ebert and Meumann, Fracker, Judd, Ruger, Dallenbach, Bagley, Crafts, Bray, and numerous others). That transfer does take place is frequently apparent, but why it takes place in one situation and not in another is difficult to determine. Of the several

theories that have been offered—identical elements, generalizations, ideals, and so on—none has won universal adherence. But a general agreement would be obtained on some such proposition as the following: a beneficial effect of training in a given school subject upon one's work in learning other subjects resides not in any peculiar and inscrutable potency within the subject matter itself, nor in any strengthening of the student's power of memory-in-general or attention-in-general or reasoning-in-general; it resides solely in those habits of responding in this or that way to this or that aspect or detail that are common to both situations.

Some of the experimental studies have shown that a habit that has been learned may not after all, have a favorable effect on the learning of another: it may have a hindering effect—the phenomenon of 'interference' (Münsterberg, Bergstrom, W. Brown, Culler, Poffenberger). This seeming contradiction in the two phenomena has not been well resolved, unless it be in a recent study (Bruce) wherein it has been demonstrated that if in changing from one learning task to another the stimulus is varied but the response is unchanged, a transference effect is noted, whereas if the stimulus is unchanged but the response is varied, an interference is noted.

X. THE NEURAL BASES OF LEARNING

Psychologists, it seems, have always had a leaning toward the physiological in their explanations of experiential and behavioral phenomena, and there is today a persistent interest in the neural bases of learning. According to the older conception, differences in the amount of resistances at the different connecting points, or synapses, directed the flow of neural impulses set up by stimulation at a receptor, and the effect of learning was to change these differential resistances (by some wearing-down process) so that thereafter the impulses would be steered by these new lines of least resistance into other motor channels.

Such theories imply that a human action is based in its neural aspect upon a stream of impulses that follows one specific route or set of routes, and that a learned modification is, neurally speaking, a change from one specific route to another specific route. But this ultra-simple notion of the architecture of the nervous system has been well-nigh demolished by numerous experimental researches. The facts of equivalence of stimuli, of transference, of variability in a maze habit, to name a few, are difficult or impossible to interpret in terms of such

pictures. So, too, with facts of everyday schoolroom observation; e.g., when a child learns a new word, and then—if properly taught!—is able to use the word in correct grammatical sequences in a hundred different situations, or, as when he has acquired ability to multiply, can carry on this operation in innumerable connections.

Tremendous weight has been added to these objections by operative experiments in neuro-psychological laboratories. Franz and Lashley have led the way; and in latter years perhaps a dozen laboratories have provided opportunity for work of the sort (by Cameron, Loucks, Maier, C. W. Brown, Liggett, Jacobsen, K. U. Smith, Krechevsky, Ghiselli, and others). In outline, the procedure is to train an animal on a learning problem, then operatively to deprive it of some region or regions of its brain or other structures of its central nervous system, and then to test the animal for its retention of the habit that had been learned previous to the deprivation. A variant procedure is to test an animal for its ability to learn an entirely new habit after such operative loss of nerve structures. Certain highly specific functions, such as ability to learn to choose a signal that bears a detailed visual pattern, may be found dependent upon the integrity of very limited parts of the brain. Yet when anything like complex behavior is to be learned, such as the true pathway in a maze, no single part of the cerebral cortex seems absolutely essential, but such learning is a function of the cortex as a whole or of as much of it as the operator's knife or cautery has left intact. Thus, a complex habit is not dependent upon the particular neural connections in any specific area of the brain but upon the total quantity of brain tissue that is intact. To generalize: *Learning is not the building up of highly specific and fixed pathways, but the reaching of some new equilibrium in that dynamic field called the nervous system.*

One thing is sure: the conventional schemata with which the processes occurring in the nervous system have been represented on paper and blackboard are as likely to impede as to facilitate a fair understanding of how learning does actually occur. For all practical purposes, then, the less we think of the learner in physiological terms and the more we observe what and when and in what manner he learns, the more profitable will our educational efforts be.

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CHAPTER XXXIII

CONTRIBUTIONS TO EDUCATION OF SCIENTIFIC KNOWLEDGE ABOUT INDIVIDUAL DIFFERENCES

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I. INTRODUCTION

The science of psychology is not the discoverer of the fact that individuals differ in respect to mental capacities. Recognition of the existence of significant differences in intelligence can be seen in the educational philosophies of Plato and Aristotle; in the doctrines and practices of most educational theorists and pioneers since. Their views, however, were based upon observation alone, not upon systematic and experimental study. Until the latter half of the nineteenth century, psychology was scarcely an experimental science; and although individual differences were studied during the last quarter of the nineteenth century, the problems of human variability were not intensively investigated until the turn of the twentieth.

With the growth of experimental psychology, more especially with the development of tests whereby individual abilities and traits might be measured, the nature and extent of human differences passed from speculation and opinion to objective study and more precise statement. For the development of tests of intelligence we are indebted primarily to the brilliant work of Alfred Binet and to those who built upon the foundation he laid. There are available today not only revisions of the Binet-Simon individual test of intelligence, but a variety of group tests intended for all ages from the kindergarten through adulthood.¹ In addition, there are several developmental scales, or baby-tests, intended for use with infants as young as one month.

¹ For further treatment of intelligence testing, the reader may consult Chapter XXIX, by Goodwin Watson.—*Editor*.

With the testing movement under way, psychologists explored the possibilities of measuring other aspects of individuality. There followed performance tests, intended to provide an index of intelligence without calling upon verbal ability; aptitude tests, such as mechanical, musical, artistic; tests of personality, character, ethical and moral judgment; tests of social maturity; tests of educational achievement; and tests of vocational interest and aptitude, such as clerical, scientific, legal, and medical. Their development was motivated, among other things, by a desire to gain insight into the nature and extent of human variability. Of the various types, those of intelligence and achievement are the most highly and satisfactorily developed at the present time; but the others, in the hands of skilled interpreters, may provide significant information with regard to a person's individuality.

II. THE RANGE OF HUMAN VARIABILITY

There are no scientific doubts about the existence of wide individual differences in mental capacities. Numerous curves of distribution have been published showing such variation with respect to almost every psychological process, as well as for a variety of physical and anthropometric measures. All of these curves, found experimentally, approximate more or less closely the well-known normal probability curve, and it is now the orthodox doctrine that human traits are so distributed. The fact that in any given investigation the actual curve is more or less irregular is attributed to errors of measurement and to an incomplete sampling of cases, although investigators do not expect to find a perfectly regular curve in any given situation. The so-called 'normal frequency' (or probability) curve shows a continuous and essentially symmetrical distribution; that is, there is one mode about which the cases cluster and the frequencies diminish as the distances from the mode increase.

Systematic study of individual differences has shown that, contrary to popular opinion, persons do not fall into distinct types so far as psychological traits are concerned. If it were true that human beings are divisible into types, statistical distributions of the measurement of a particular trait should reveal a bi-modal or a multi-modal curve; that is, a curve having more than one mode or point of concentration, at or near which a large portion of the population would fall in the distribution, with significant gaps between the modes.

If such distinct types did exist, the educational implications would

be clear and relatively simple; for then it would be only a matter of identifying each individual and allocating him to the group of which he is a representative. But human beings do not divide themselves so simply and readily; consequently, the educational problem is more difficult and involved. Individuals in their range and complexity of variability cannot be classified into, for example, a three-fold division of genius, mediocrity, or idiocy; nor as introvert or extrovert; nor as giant or dwarf. This does not mean that there are no geniuses or idiots in the population; but it does mean that these two groups are but the extremes of a continuous gradation in mental capacity from the almost totally incompetent to the most brilliant.²

III. THE CAUSES OF INDIVIDUAL DIFFERENCES

Although there is no question regarding the nature and extent of individual differences in mental capacity, there is disagreement with respect to the causal factors and their relative importance. In approximately the last forty years, however, much progress has been made in psychology and biology toward an explanation of differences in mentality as we find them. The *basic* factors contributing to these differences are really two in number; namely, heredity and environment or, as Galton so aptly called them, nature and nurture. It is possible that a third factor might be listed as basic, although it seems preferable to regard it as secondary. This is the factor of age; the changes in the individual that take place during the process of growth and decline: the acquisition of motor-control, the development of skills, the growth of language, socialization, the acquisition of a vast body of information, emotional development and refinements, the growth of interests and attitudes—and, subsequently, the decline of these capacities in the late years of the life cycle.

The remaining factors are really of a secondary character. Although they are readily seen as particularized aspects of nature and nurture, they are nevertheless sufficiently important to warrant independent consideration. These factors are so-called 'race,' nationality, sex, physique, and personality. It is under these headings, as well as under heredity

² There are several important theoretical problems in connection with this topic; but they cannot be discussed here. See E. G. Boring. "The logic of the normal law of error in mental measurement," *American Journal of Psychology*, 31: 1920, 1-33; and F. S. Freeman. *Individual Differences*, Chapter 2. (Henry Holt & Co., New York, 1934)

and environment, that the factors causing individual differences in abilities are studied.

1. The Contribution of Genetics

Insight into the heredity-environment problem is especially significant, since it is important to know what mental equipment a child starts with, how far environmental forces—including schooling—may be expected to add to his equipment, whether an optimal environment can create or increase capacity, or whether environment can only furnish the individual with materials to work on. It is doubtful whether the biological and psychological sciences can even now furnish an unequivocal answer to these questions. Available experimental evidence, however, is extensive and thorough enough to free the problem from mere bias and anecdote, and converging lines of evidence offer some very plausible conclusions.

The rôle of heredity (nature) may be studied in a variety of ways. With the development of the science of genetics, considerable insight into the biological basis of human variability has been furnished through the gene theory.³ The germ cells of each parent contain many, many thousands of genes; there are diversities among the sets of genes within the cells of each parent; and in the newly fertilized egg the substances of both parents are united to form still more new combinations. Because of the diversities of germ cells in each parent, it is extremely improbable that any two children, even within the same family, will be developed from the same gene combination, excepting identical multiple-birth children. In fact, biometricians have estimated that the chances of two siblings being identical—unless they are developed from a single ovum—are about one in 550,000. The facts that the germ cells within each parent are diverse, that the biological inheritance of each child is bi-parental, and that every trait is the product of the interactions of many genes explain *genetic* diversities among children of the same family and between parents and children. But since the germ cells within each parent are not entirely disparate, it is to be expected that in general there will be an appreciable degree of correspondence between siblings, and between parents and children. That is the case, as is demonstrated by numerous correlational studies both of physical and of psychological traits.

³ See, for example, H. S. Jennings. *The Biological Basis of Human Nature*. (W. W. Norton and Co.: New York, 1930. 384 pp.)

Experimental embryologists and geneticists have emphasized increasingly the importance of environmental factors during the gestation period in animals, human and infra-human. The significance of developmental conditions is also stressed by plant-breeders. Yet, strangely enough, there has been, and still is, some resistance to the doctrine that environmental conditions are significant as regards human development after birth. But in granting the importance of environmental factors, one does not imply genetic equality of all individuals.

No characteristic human traits can be ascribed wholly to hereditary factors, nor wholly to environmental factors. Instead, they are the results of the dynamic interrelationship of the growing organism and its milieu; that is, whatever traits an individual possesses are the product of genetic equipment and the conditions of growth in the environment from the moment the ovum is fertilized. Individuality and human nature are thus not merely the result of an environment that simply inhibits, or warps, or permits the development of a part of original nature. The two factors, genetic constitution and environment, interact in a single developmental process. This being the case, the educational implications are clear and significant; for the sooner and longer that optimal environmental conditions are present, the less will be the 'natural' limitations.

2. The Rôle of Inheritance

The rôle of inheritance, or nature, has been studied in a variety of ways.⁴ First, Galton, and then others, investigated the frequency with which eminent men and women occurred within the same families, the purpose being to discover whether or not such eminent persons appeared within certain families more frequently than within others. The early tendency was, and is today, though to a lesser extent, to interpret the results of these studies as showing the primary and perhaps exclusive significance of the hereditary factor in producing eminent men and women, because of the high frequencies found *within* given families. Other studies, however, beginning notably with those of Cattell, produced some very telling evidence demonstrating the significance of environmental as well as genetic forces, in the attainment of eminence; so that today the two sets of factors need not be regarded as independent or as mutually exclusive.

A second method is the study of trait resemblances within families.

⁴ See F. S. Freeman. *Op. cit.*, Chapter III.

Here, again, the argument has run that if members of the same family resemble one another much more closely than unrelated persons, the greater trait similarity must then be due to inheritance. But as before, similar environmental factors within a family were practically ignored. In this connection, the study of foster children is especially revealing.⁵ It has been demonstrated that siblings reared in foster homes that are significantly different in quality do not show nearly the same degree of resemblance as siblings reared in the homes of their own parents. In fact, there seems to be a significant degree of correspondence between the child's mental development and the quality of the foster home, and there appears to be more than a chance degree of similarity between mental development of foster children and of own-children brought up in the same home. The degree of similarity between siblings brought up in different foster homes is influenced by the *age at which they were separated, the length of time they were separated, and the disparities between the qualities of the several foster homes.*

The possibility of affecting mental development through the environment is admitted even by some writers of 'hereditarian' leanings. B. S. Burks, writing in the *Twenty-Seventh Yearbook* of this Society, (Part I, 1928, Chapter X) states: "The maximal contribution of the best home environment to intelligence is apparently about 20 I.Q. points, or less, and almost surely lies between 10 and 30 points. Conversely, the least cultured, least stimulating kind of American home environment may depress the I.Q. as much as 20 points. But situations as extreme as either of these probably occur only once or twice in a thousand times in America." Possibilities of variations within of 20 or 30 points one way or the other are extremely important. It remains to be seen, however, what the actual limits of change and the actual frequencies may be.

Twins, fraternal and identical, offer a more satisfactory subject of study than do ordinary siblings. Statistical studies reveal that the degree of resemblance between fraternal twins is much greater than that between ordinary brothers and sisters. For example, the usual correlation coefficient found for traits of siblings is about +.50; whereas the coefficient for fraternal twins is about +.75. But fraternal twins, like ordinary siblings, have developed from two independently fertilized

⁵F. N. Freeman, *et al.* "Influence of environment on the intelligence, school achievement, and conduct of foster-children." *Twenty-Seventh Yearbook, Part I*, of this Society, 1928, Chapter IX.

ova; their genetic constitutions, therefore, need be no more alike than those of ordinary siblings. The closer similarity of fraternal twins must, therefore, be ascribed to the greater similarity or constancy of environment in which fraternal twins develop, as contrasted with ordinary brothers and sisters. In the case of twins, prenatal conditions are more nearly uniform; the conditions of life after birth correspond more closely than in the case of siblings; their similarities are stressed; and a conscious effort is made not to discriminate between them. Thus the study of fraternal twins reveals the importance of developmental conditions operating with genetic constitution.

Identical twins, however, show a significantly higher degree of trait correspondence than do fraternal twins, the correlation coefficient being in the vicinity of $+.90$. But studies of identical twins *reared apart* are most revealing, for it has been shown that there exist among them varying degrees of inequalities of mental ability, emotional and temperamental traits, and physical characteristics. Here again the disparities between identical twins depend upon two factors: first, the age or developmental phase at which the twin pair was separated; and second, the number of years they were separated. It is a question not only of the *amount* of time spent in separation; but the *period* in the developmental cycle at which it occurred.

It appears, therefore, in the light of evidence derived from these fields of investigation, that the extreme hereditarian interpretation of individuality, which ascribes little or no significance to developmental conditions in human mental growth, must be abandoned. In fact, an extreme hereditarian view would mean that the chief or sole function of the educative process would be the imparting of information and the development of habits. Education as growth, as development, as the formation of individualities would be a fiction.

3. The Rôle of Environment

Investigations of nature and nurture, though often directed primarily at one or the other, are relevant to both, since the separation is more or less arbitrary. Studies directed toward the evaluation of environments have been of several sorts. First, the origins and environments of men and women of sciences and letters were studied; particularly with a view to determining the significance of their educational opportunities.⁶ In general, it has been found that in those geographic

⁶For example, J. McK. Cattell. "A statistical study of American men of science." *Science*, 24: 1906, 732-42; also F. S. Freeman, *Op. cit.*, Chapter IV.

areas of the United States where formal and informal educational opportunities were superior, a larger number of men and women in sciences and letters were produced than might be expected on the basis of population. Subsequent studies have revealed that as educational opportunities and traditions improved in several other sections of the country, an increasing number of men and women in sciences and letters were produced in those areas.

A second method commonly employed is the study of relationships between children's mentality and parental occupations. The argument adduced here has often depended upon the investigator's particular point of view. Since the trend is for children's mental ratings to rise as the levels of parental occupations rise, some have maintained that this is clear evidence of superior biological inheritance; for, they argue, superior persons tend to land in the higher occupational levels, whereas inferior persons tend to gravitate toward the lower levels. Others maintain that superior occupational levels are accompanied by superior environmental conditions of every sort: health, nutrition, intellectual stimulus, and formal education. But here again, as previously stated, the more plausible interpretation is the one that makes the growth process an integral of both sets of factors.

In this connection it is significant that several investigations show about 75 percent of the children having intelligence quotients above 110 coming from less preferred social and economic groups, although the highest social and economic groups provide more than their quotas of superior children.⁷ Furthermore, on the strength of available data, there is a forcible argument that early favorable developmental conditions, beginning in the nursery school or earlier, produce effects upon children's mental development—effects that are real and lasting.⁸

The effects of developing in a superior foster home have already been mentioned. This and other converging lines of evidence lead to a

⁷ S. M. Stoke. *Occupational Groups and Child Development*. (Harvard Monographs in Education, No. 8, 1927); also E. M. Lawrence. *An Investigation into the Relation between Intelligence and Inheritance*, (British Journal of Psychology, Monograph Supplement, 5, No. 16, 1931)

⁸ H. Gordon. *Mental and Scholastic Tests among Retarded Children*. (London, Board of Education, Educational Pamphlet, No. 44, 1923); also B. L. Wellman. "Growth in intelligence under differing school environments." *Journal of Experimental Education*, 3: 1934, 59-83; and "The effect of preschool attendance upon the I.Q." *Ibid.*, 1: 1932, 48-69.

significant conclusion that has already been suggested in this chapter; that is, that simply to 'let nature take her course' in the mental development of children is to deny those children the possibilities of a more nearly complete development of their genetic potentialities. Individual differences assert themselves in early infancy, but the extent to which those differences will continue to assert themselves will depend in part upon the early presence of optimal developmental conditions. The nursery school, therefore—or its equivalent in the home,—assumes new theoretical importance in mental development, as well as in the training of habits. Recognition of variability and provisions for it in the educative process are, thus, matters which merit attention before the first grade and in ways other than the obvious procedures of homogeneous grouping, for the child's education begins at birth. The duration, quality, and intensity of educational forces are influences of the first order in the production of individual differences in mental abilities. It remains to be demonstrated to what extent the theoretical possibilities can be realized in practice.

The effects upon individual differences produced by approximately identical training may also be regarded as an aspect of nurture. The question is, does such training increase or decrease those differences? This is not the place to enter into a technical discussion of the evidence that would enable us to answer the question in the affirmative or negative. But educationally, there can be no question in regard to the significance of the findings: namely, that regardless of the individual's level prior to training, his skill and effectiveness under training are enormously improved. This again suggests the importance of systematic and optimal conditions of education; and it suggests, further, a partial explanation, at least, of the relatively smaller differences that exist between the mass of individuals at or near the central tendency of the distribution of human mental abilities, most of whom have had a minimum of optimal training.

4. The Factors of Race and Nationality

Analyses of the secondary factors, already specified, have not revealed new basic interpretations beyond those mentioned in the preceding discussion. The factor of so-called 'racial' membership has been quite thoroughly exploded, with the result that there appear to be no reliable innate differences between the groups studied. In other words, the alleged superiority or inferiority of Nordics, Alpines, or Mediter-

ransians finds no support in scientific investigations. It is true that in the United States studies of Negro and North American Indian intelligence indicate that these two groups are inferior to the white population in manifested abilities. However, because of the disparities in social, economic, cultural, educational, nutritional, and hygienic conditions, conclusions are at present impossible regarding their *innate* potentialities, even though their *manifested* abilities show reliable differences. It remains for the future to demonstrate whether these two groups are *by nature* inferior to white groups. In the mean time we can only say that under existing conditions of environmental inequalities Negroes and North American Indians have, as groups, failed to reach the levels attained by the white population, as a group.

Nationality and race cannot be disregarded, however, in seeking to explain individual differences; for they are *culturally* significant, and it is not improbable that they are among the most important of the environmental factors that nurture and shape intellectual potentialities. In other words, individual differences due to race or nationality seem to be primarily environmental, not genetic. That being the case, it would be unsound to attempt educational guidance and differentiation on the basis of race or nationality, so far as learning ability is concerned. This holds also for Negroes and North American Indians; for, of these, about twenty-five percent reach or exceed the mean performance of the white population.⁹

5. The Factor of Sex

Cultural forces again—in the broadest sense—seem to be the principal factor accounting for whatever sex differences exist in respect to intellectual abilities. It is true that some minor differences are found during childhood; as, for example, the superior language ability of girls, superior arithmetical ability of boys, and superior mechanical or manual abilities of boys. In regard to mechanical and manual skills, it is not improbable that physical differences are of some importance. The reasons for the slight differences in language and arithmetic are not clear, but one seeking a possible cultural influence to account for these would not have much difficulty in finding it; for it is well known that from the cradle up distinctions in toys and play activities and equip-

⁹ See especially O. Klineberg. *Race Differences*. (Harper & Bros.: New York, 1935, 367 pp.); and F. S. Freeman, *Op. cit.*, Chapter V.

ment are made between the boy and the girl. Finally, on tests of general intelligence boys and girls, as groups, do equally well.

Thus it appears that if sex membership is a significant factor in the determination of individual differences, it is so because of the cultural influences and distinctions made with respect to the sexes, granting, of course, certain physical and biological differences and limitations imposed upon the female sex. Educationally this can mean only one thing: namely, that the educative process cannot use sex membership as a basis for educational differentiation, except as that is dictated or made to seem desirable by the *mores*, culture, and economy of the society in which the education is being given. In this, as in other matters, individuality will assert itself; for it is found that girls show the same range, variation, consistency, and inconsistency of abilities, interests, and purposes as do boys.¹⁰

6. The Factor of Physique

For our purposes, there are two questions regarding physique. First, does mental development take place at the expense of physical? Second, is there any relation between physique and intellect? While it is true that superior children, as a group, are somewhat accelerated in physical development, and mentally inferior children, as a group, are physically retarded, in general the relation between physical and mental development is useless in establishing association of intelligence and physique in any given case. This has perhaps led to the doubtful conclusion that a child's physical history and development have no bearing upon his mental development. This might be true of the relatively advanced children who have been the subjects of study in schools. But what is not definitely known is the effect upon mental development produced by bad hygienic conditions in infancy and early childhood, although indirect evidence indicates that they may have serious consequences. Practically all available studies of health and mental development deal with school children suffering from malnutrition, defective teeth, diseased tonsils, adenoids, simple goitre, hook worm, and so forth; the conclusion commonly reached is that these deficiencies have little or no effect upon mental development. But the validity of this conclusion for *all* children is doubtful, because the children investigated were already

¹⁰ Cf. E. A. Lincoln. *Sex Differences in the Growth of American School Children*. (Warwick and York: Baltimore, 1927, 189 pp.)

well along in their development. We are not warranted, therefore, in assuming that individual differences in intellect are unaffected by factors of health beginning at birth or before. Presumably if diseases and abnormalities are reduced to a minimum, unwholesome effects upon development will also be at a minimum.¹¹

7. The Factor of Age

It is important to know whether an individual maintains his relative intelligence within a group for the duration of his life; otherwise, educational prognosis and prediction are not possible. Fortunately, the answer, extraneous and accidental factors being eliminated, is in the affirmative, since mental growth is neither haphazard nor capricious. But these extraneous and accidental factors are the ones that must be sought and accounted for in attempts to understand individual deviations from the rule, for ultimately the unit of education is the individual, not the group.¹²

Changes that come with age are not only a matter of quantitative differences, not merely a matter of accretions. As the child matures, there are qualitative differences in the nature of his responses and general behavior. He develops new skills, new interests, new purposes, new insights, and changes in attitudes; his perceptions are richer and more highly differentiated. These are emergents of his increased capacities and accumulated experiences which appear with increasing age and education. It is an educational truism to say that the curriculum, therefore, must change to meet these qualitative differences through the introduction of educational materials that, psychologically speaking, should be functionally significant for the learner.

IV. VARIATIONS WITHIN THE INDIVIDUAL

Not only do individuals differ from one another in capacities; they *may* also vary within themselves; that is, their abilities *may be* irregular. This, as well as other considerations, of course, gave rise to an interest in mental organization; that is, the nature of intelligence. We should have to go too far afield if we attempted even to describe briefly the current theories of the nature of intelligence, their similarities, dif-

¹¹ For a summary of studies, see D. G. Paterson. *Physique and Intellect*. (D. Appleton-Century Co.: New York, 1930, 304 pp.)

¹² Cf. F. S. Freeman. *Op. cit.*, Chapters VII and VIII.

ferences, and implications.¹³ It must suffice to say that, regardless of the particular theory to which one subscribes, evidence indicates there is a high degree of correspondence among an individual's abilities in the usual variety of school subjects; although here again, we hasten to add, there are always exceptions. Not only do school and test data support this view of general correlation, but the view appears to be consistent with the most widely accepted theory of brain function.

There seem to be, nevertheless, two or three types of abilities that can be regarded as special abilities; in particular, music and the graphic arts. Some psychologists would add mechanical aptitude, but in view of the character of our educative process it seems doubtful whether this should be added. For creative effort in music and the graphic arts, superior general intelligence is requisite, as it is, indeed, for creative work in any field.¹⁴

Disregarding for the moment the two, or possibly three, special abilities, it is evident that educational procedures and differentiations must rest primarily upon the child's general intellectual level.

As always, when dealing with human subjects, there are exceptions. There are children who suffer from serious disabilities in reading, spelling, and writing that are not attributable to defective intelligence, but to certain biological anomalies in the child or to unfortunate early training.¹⁵ Still other children of normal or even superior capacity may appear spuriously dull or may manifest inconsistencies and irregularities of performance for still other reasons of a non-intellectual sort. Among these are emotional and personality difficulties due to home, community, or school influences, different degrees of interest, sensory handicaps, speech defects, and physical deformities or handicaps.

It is not expected that teachers and administrators shall be psycho-educational clinicians, but as part of the science and art of teaching, they should be familiar with and recognize all symptoms of educational maladjustment.

¹³ For example, C. Spearman. *The Abilities of Man*. (Macmillan Co.: New York, 1927, 415 pp.); E. L. Thorndike, et al. *The Measurement of Intelligence*. (Teachers College, Columbia University: New York, 1926, 616 pp.); C. L. Hull. *Aptitude Testing*. (World Book Co.: Yonkers, N. Y., 1928, 535 pp.)

¹⁴ Cf. L. Hollingworth. *Special Talents and Defects*. (The Macmillan Co.: New York, 1923, 216 pp.); also F. S. Freeman. *Op. cit.*, Chapter IX.

¹⁵ Cf. S. T. Orton. *Reading, Writing and Speech Problems in Children*. (W. W. Norton & Co.: New York, 1937, 215 pp.). Also M. Monroe. *Children Who Cannot Read*. (University of Chicago Press: Chicago, 1932, 205 pp.)

V. EDUCATIONAL PROVISIONS FOR INDIVIDUAL DIFFERENCES

Educational devices intended to provide for individual differences in learning ability and accomplishment among school children are numerous and vary in detail.¹⁸ All of them, however, have a common basic principle; namely, the creation of a school situation wherein each individual will or should proceed at a pace and work at levels commensurate with his abilities. Furthermore, they proceed on the sound principle that it is psychologically desirable for a pupil to be in a learning situation that will challenge his capacities.

The most common method of providing for individual differences is, of course, homogeneous grouping. To be sure, there are some educators who maintain that such grouping is ineffective or undesirable, or both. Neither one of these objections, however, will stand close scrutiny if the school does more than just classify into homogeneous groups by providing also differentiated curricula that differ in intensity and extensity of materials, and that provide special methods and plans for individuals of superior, inferior, or mediocre ability. In other words, it is not sufficient merely to segregate; the actual content and form of education must be adapted to each of the groups.

If aspects of individual differences other than variations in general intelligence are to be taken into account in the educative process, the educator must consider, also, special abilities wherever they are found, such as music and the graphic arts. Full provision for these would mean a marked departure from the usual practice of expecting all boys and girls to subject themselves to the conventional type of education, for it implies the creation of secondary-school curricula in which, let us say, music and the fine arts become the core of the curriculum, while the traditional subjects are relegated to secondary importance. Complete recognition of individual differences means also recognition of specialized interests and purposes in individual cases. Likewise it connotes clinical study and educational treatment of those who are 'exceptional' for reasons other than intellectual superiority or inferiority. In short, guidance in education is fundamentally a matter of understanding and utilizing our knowledge of human variability in mentality, in traits of personality and temperament; in understanding the causes of failure

¹⁸ Cf. R. O. Billett. *Provisions for Individual Differences, Marking, and Promotion*. (Bulletin, 1932, No. 17, National Survey of Secondary Education, U. S. Dept. of the Interior, Office of Education). Also *The Grouping of Pupils*. (Thirty-Fifth Yearbook, Part I, of this Society, 1936)

in school, as well as of success; in appreciating the fact that the human organism is not merely a mosaic of a variety of intellectual, temperamental, and physical traits, but is rather an integrated unit, the effectiveness of whose intellect may be increased or vitiated by other aspects of his individuality.

VI. CONCLUSION

It has not been possible here to present in any detail the actual results provided by the great mass of materials contributed to the concept of individual differences through biological, psychological, and sociological research. Nor has the attempt been made to examine closely the many theoretical implications involved. But even so, from what has been presented, two principles very significant for our purposes emerge from the scientific and systematic study of human variability. First, *nature and nurture are inseparable aspects of a single growth process*. Attempts to segregate each of these are artificial and gratuitous, for the one is inconceivable without the other. Second, *the sooner home and school and society provide optimal conditions for development, the less will be the limitations imposed by nature upon any given individual*. The rôle of the school in this process is obvious, from the nursery school through the university. But to be most effective, the schools need the coöperation of all other enlightened social and economic agencies, for the schools provide only one of the several especially important environments.

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CHAPTER XXXIV

CONTRIBUTIONS TO EDUCATION OF SCIENTIFIC KNOWLEDGE ABOUT MENTAL GROWTH AND DEVELOPMENT

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That the school's advancing program is intimately bound up with the mental growth and development of the child is of course obvious. Throughout this period of child growth the curriculum is elaborated, not only by spreading out into new and equally simple areas, but also by extending upward into problems, situations, and experiences demanding a higher order of learning. The child's increasing ability to learn abstract and relational content is essentially what is meant by the growth of mental ability. But mental life is a broader term and we can arrive at its meaning only by having a steady regard for the child as a whole.

I. UP FROM INFANCY

It is clear that the process of mental growth has been going on long before school entrance. It can be shown to begin at birth, and perhaps somewhat before birth, if we are willing to consider the earliest conditioned responses as indicative of true learning. Certainly at birth there are a few things that the child must learn. He must learn to suck in order to take nourishment. For this there is a mass preparation in biological mechanism. There are internal pressures, as it were, geared to the external stimulations in touch, taste, and smell. Even so, some children are relatively slow in solving this elementary problem, while others resolve the matter so simply, so surely, and so rapidly that it may appear to the casual observer that 'instinct' by itself was sufficient.

In attempting to measure mental growth in early infancy one finds very little material to draw upon. During the first year of life there has not been a great differentiation of growth mentally. Notable changes rather are in the development of motor skills and adjustments, such as better control over parts of the body. The infant is busy getting

acquainted with his immediate environment. His steadily growing efficiency is both a condition and a result of this inner drive to obtain his own comforts and securities. At these stages, mental testing is largely a description of his facility in developing these numerous skills. Eventually, through creeping, sitting up, standing, walking, climbing stairs, backing up, standing on one foot, whirling, jumping, and dancing, elaborations in the motor sequences are seen to have some very special meanings in terms of adjustments to the environment. With creeping, the child's geography expands. With walking and running he assumes a mastery over the environment not given to stationary objects. Similarly with respect to language: when a child's first intelligible word has brought his mother to his side, securing for him some object he wanted, the child has learned a new power. He has enlarged his world and extended his control over it.

All this has meaning for education. In these early preschool days, education consists essentially in providing the opportunities for motor and linguistic development. A child, for example, can be so discouraged in his first attempts to creep or walk that the process is definitely retarded. He may, on the other hand, be so encouraged as to undertake motor activities usually considered out of line or abnormal for infants. Thus, with appropriate training such complex skills as roller skating, swimming, dancing, and acrobatics may be added to the child's repertoire shortly after he is able to walk.

Through all such learning sequences there runs a trinity that will be potent up through his school days; namely, maturation + need + opportunity. No task—physical, motor, or mental—can be performed before adequate structural preparation has been made. Thus one good look at the child's physical and motor mechanism at birth will suffice to reveal why the child cannot sit up or stand. He is shaped like an inverted cone, without any bones or muscles sufficiently developed to maintain his body in an upright position. Ordinarily the environment conspires with the organic tensions in supplying the need. The child wants some objects that are not immediately in hand, and he uses his improved mechanism to propel himself toward the object. Many such objects are at first food or food substitutes. If they do not supply actual nutrition, they do at least offer certain concomitants of nutrition previously found satisfying in touch, taste, smell, or manipulation. The opportunity consists essentially in having such objects about, something to grasp for, something to creep toward, something to climb up,

something to handle; and most importantly of all *somebody*, a mother or a mother substitute, who combines all these qualities and adds to them certain pleasant social aspects through soft touch, vocal tone, and facial expression.

Since schools are being extended downward to include children as young as two years, it is becoming more important for teachers to be aware of these earliest conditions and factors in child education. As a matter of fact, much of what goes on in the earliest infant days will be repeated more elaborately and more subtly up through the school years. Always there is a maturation level, whether or not we are able to discern it and measure it; always, for effective learning, this level and environmental opportunities must be nicely articulated.

The school is enabled to do group work at these younger levels largely because a great area of motor and mental development is shared by most children within the normal range. The child whose habits of eating, sleeping, and elimination are under reasonable control, who can walk, talk, and play with companions, meets the principal criteria for the beginning of formal education. What a child has been able to do in the past without formal schooling of any kind is a tribute to the combined power of maturation, child need, and environmental opportunity, and it is one of the striking phenomena in human life. Seldom does a child within the normal range of mental development fail to solve the learning tasks that he sets before himself, whether it be to discover in his own terms what makes a thing go, to finish a sentence he has started, or to read a complex emotion on his mother's face. Anyone who has guided young children is impressed with a child's readiness for learning, with the tremendous force harnessed through what adults call 'play,' but which turns out to be a most effective learning device. In short, education begins in the home and the neighborhood, and it carries on there throughout the child's school life.

II. ENVIRONMENTAL MODIFICATION OF INTELLIGENCE

It is easy to fall into the habit of thinking of mental growth or intelligence as a *something* that does things or that enables the child to do things, of regarding intelligence as some organ (*e.g.*, the brain) that, growing in a way unaffected by the impact of environment, will forever set the limit of mental maturation and thus determine how much or how little the child can learn.

Nevertheless, the evidence supplied by research is making it apparent that intelligence is not fixed and determined. Naturally, without

an appropriate development in the higher centers of the brain, intelligence as we know it will suffer, and may even be, indeed, almost completely lacking. Yet for brains that appear intact and efficient physically and neurologically, there is no guarantee that mental growth will proceed according to any standard. It may well be that if one knew more about the neurological situation, one could match, step by step, failure in the dynamics of mental growth, as expressed by measured comparative behavior, with structural or functional defect within the brain and nervous system. One may look forward to a time when much of this work will have been accomplished.

But even such work must beg the question as to the possible influence of environment, of educational procedures upon the development of intelligent behavior. Perhaps brain, like heart or muscle, may not be developed by simple physical nourishment alone. It is in the utilization of organs, as well as in their genetic potentiality, that we have a key to minimal or maximal development. Nobody knows by sheer extrapolation from infant measurements how strong the child's arm may become, but one may predict that through optimal nutrition, exercise, and control, the arm will reach a stage of development not typical of the ordinary arm in ordinary circumstances. With respect to encouraging the development of the nervous system so as to produce maximal mental growth and efficiency, one may postulate a similar cause-and-effect sequence, but there is no sure means of bringing about such acceleration. There is evidence on the other side that brain injuries sustained at birth or later have a hampering effect upon such development, and it is known that the ravages of certain diseases, and finally of senescence, hold or reduce intelligence to its lower child-like levels.

For educators, these matters can no longer be considered as just a theoretical discussion or as a controversy between geneticists on the one hand and sociologists on the other. No matter how progressive the school may become in such matters as extending enriched physical, emotional, and esthetic opportunities to children, one may predict that the school child will of necessity continue to be primarily a learner in the field of the abstract. For it is with respect to the abstract that the home and the neighborhood are inadequate. They do not have the resources, the techniques, the methodology, the controls, or the group stimulation necessary to bring about needed learning in the vast area of the so-called 'school fundamentals.' Learning, in the sense of developing and organizing great patterns of knowledge that will aid the

learner in the solution of personal, vocational, and social problems, will constantly demand the center of the school stage.

With the appearance of the *Twenty-Seventh Yearbook*, entitled "Nature and Nurture,"¹ there was mustered for the first time substantial evidence for and against the thesis that what happens to the child may have an effect upon his mental growth. In the work of Freeman and his associates this postulate was supported by strong evidence. In other situations described in the same Yearbook by Terman and his associates, however, the mass effect of environment upon mental growth could not thus be shown. It should be noted that on both sides of this controversy there were no really special environments. There were "good" homes and "poor" homes, but these were so designated on the basis of conventional observation. The problem would be more clean-cut if one knew what a "good home" was in terms of its effect upon the child's intelligence, and then in the light of such knowledge had proceeded to modify the child's environment accordingly.

To date this second step has been taken more or less accidentally. Thus Wellman,² in studying the mental growth of preschool children, discovered that children who had steadily attended a modern preschool had gained, on the average, twenty points in I.Q. She found, too, that this gain tended to persist through the high school, and that it could not be ascribed to practice effects. Such gains in I.Q. had not been reported for young children generally, for the standardization of the tests (Stanford Revision of the Binet-Simon Scale) is such as to preclude any general increase in I.Q.'s over a given chronological age range. The increase on the part of children attending preschools, then, is no artifact. It is substantial, long continued, and consistent with the school performance that these children show up through the elementary grades. It is particularly noticeable on the part of children at the average or somewhat below the average of other children within the group. It is not shared to any extent by the brightest children.

That Wellman's discovery is not an epiphenomenon is borne out by other recent studies. Thus Skeels³ has made an intensive study of

¹ *The Twenty-Seventh Yearbook* of this Society, 1928, Part I. "Their Influence upon Intelligence." Part II. "Their Influence upon Achievement."

² Beth L. Wellman. "The effect of preschool attendance upon the I.Q." *Jour. Exper. Educ.*, 1: 1932-1933, 48-69.

Also "Growth in intelligence under differing school environments." *Ibid.*, 3: 1934-1935, 59-83.

³ Harold M. Skeels. "Mental development of children in foster homes." *Ped. Sem. and Jour. Genet. Psychol.*, 49: 1936, 91-106.

seventy-three illegitimate children placed in good homes under the age of six months. All the mothers were dull or feeble-minded, with average I.Q. of 84. The fathers, while known, were not given mental tests, but were found to be in the lowest two economic groups. It is unlikely that their average I.Q. would rise above 90. When, after a lapse of from one to five years, these children were measured by standard mental tests (Kuhlmann and Stanford Revisions), the average I.Q. for the seventy-three children was 115. Certainly anyone would have predicted that children born into these mental and social strata would do well to reach an average I.Q. of 100. There would have been no astonishment had their I.Q.'s been as low as 85 or 90. But there are no feeble-minded children at all in this sampling; there are several very bright children, and the average I.Q. of 115 is about that of the children of university professors. Moreover, children who were placed longest in these good foster homes gained the most. Skeels now has over twice as many cases similarly measured and controlled, and the results are the same: the illegitimate children of a large sampling of dull and feeble-minded mothers and out-of-work or laboring-class fathers, if placed in good homes in early infancy, will turn out to be bright children as measured by the best tests now available.

To a whole generation of educators brought up on the soothing concept that nothing much could be expected of Jukes, Kallikaks, and similar degenerate breeds, such findings must come as something of a shock. Yet who among the early biologically inclined psychologists and educators, hailing the inheritance of feeble-mindedness as a wonderful demonstration of the laws of nature and of Mendel, took any radical steps *on the environmental side* to counteract these supposedly potent forces? Rather it should have been predicted from the work of Galton, Pearson, and their followers that any correlations of intelligence between midparent and child that, for large samplings, average $r = .50$ could not conceivably permit much determinism as between one generation and another. A correlation of this size, after all, accounts for only 13 percent of the possible variation, leaving 87 percent of the relational area unfixed by anything coexisting between parent and child. Also a coefficient of correlation, even if much higher, would have had little bearing upon the effect of a favorable milieu upon a mass, upward shift of a whole child population.

The expectation of 'normal' growth or 'normal' behavior carries

with it the expectation of a certain kind of environment to which one is accustomed, or which is usually found in nature. When nature changes the pattern of its forces or when such patterns are manipulated by man within a restricted area, one gets results that are abnormal only in the sense that they differ from the mass expectation. For a long time it was 'abnormal' for children to achieve literacy, and many of the greatest thinkers had regarded the great mass of the human race as too weak mentally to sustain many stresses, strains, or responsibilities in intellectual areas. The emergence of democracy, which released over wide areas and for a long period of time the individual resources of the human mind, showed the fallacy of these earlier points of view. Nowadays no one looking over the records of the brightest students in the high school and the college, for example, can fail to be impressed with the unexpectedness of the appearance of such minds in humble families and in low social strata. Apparently, indeterminism from generation to generation, in combination with the subtle, but potent, effects of differential environments, has contrived to bring talent out of the most obscure, as well as out of the most expected, origins.

The relation of this phenomenon to public schooling is evident. The school, in elaborating its democratic principles, does not assert that all children are born mentally equal or that they may ever become equal. But it does hold rightly that out of any family or any community may arise almost any level of intelligence. To the extent, therefore, that any social hierarchy based on mental ability is desirable (through mounting advantages and responsibilities for the mentally able), the search must ever be in all sectors of the population. Very likely the early educational leaders did not know this or did not believe it. Their idea of the public school arose out of social and political doctrine, and it is just one of the fortunate accidents of our culture that their planning, excellent on its own grounds, should contribute also to the discovery and conservation of mental talent.

III. RELATION OF CERTAIN MENTAL GROWTH FACTORS TO SCHOOL PROBLEMS

So far as the individual pupil is concerned, none of the attributes of size, personal appearance, sex or socio-economic status may be considered of any value in predicting mental status. The only adequate basis for such an estimate is a standard individual intelligence test. Where insight into the individual is not the main object, but only the gross measurement of large classes or samplings, recourse may be had

to standard group tests. Given the results of an adequate program of individual mental testing, the teacher or administrator may still ask, just what bearing does all this have upon my work? A few statements primarily practical in import are presented by way of summary.

1. Inquiry into Out-of-School Life

Particular attention should be paid to the out-of-school life of all children who are having difficulty with their school work. If the measured mental ability is low, it still may be that the ineffectiveness of the child's efforts is a by-product of the feelings of inferiority and inadequacy that are so likely to accompany low intelligence. These feelings accompany inferior ability, not because the two go naturally together, but because the demands within the home, the neighborhood, and the school are relatively static. The parents expect the child to walk and talk normally, eventually to do as other boys do, to learn to be 'quick at things.' Without realizing it, teachers, too, have a certain expectation built up upon the average or above-average child. The dull child is therefore immediately thrown into a position of defense. Retreat or rebellion make their appearance, perhaps in alternation, in accordance with his experience as to the best form of self-protection. Every child who is having trouble with the school's curriculum is a problem in terms not only of mental growth, but also of mental hygiene.

2. Limitations of Sectioning

Nothing now available in research data would indicate the unvarying necessity of sectioning classes on the basis of ability. There are of course circumstances where this may well be done with a maximum of enrichment to the pupils involved. By and large, it seems better to permit a rather wide variation of talent within any classroom while making sure that the individual needs of each child are provided for.⁴

3. Stress on Verbalization May Not Stimulate Mental Growth

While mental status and mental improvement tend to be measured somewhat verbally, one should not jump to the conclusion that increasing emphasis on verbalization in the schools would thereby encourage

⁴The evidence pertaining to the grouping of pupils generally, particularly with respect to the merits and the precautions needed in sectioning on the basis of ability, has been presented very fully in "The Grouping of Pupils," *Thirty-Fifth Yearbook, Part I*, of this Society, 1936.—*Editor*.

such growth. Rather the work of Horn and others⁵ indicates that extreme verbalization in schools results in only half-learning or pseudo-learning. They show that there can be a verbal facility distinguishable from real insight or from true intellectual growth. Paradoxically, the school's enrichment through so-called 'liberal' or 'progressive' activities may react favorably upon abstract learning by bringing to concepts and relations a greater experiential significance.

4. Disparity between Mentality and School Achievement

One point of constant concern to teachers and personnel officers is the observed disparity between measured mental status and school performance. A child rated as very bright may nevertheless fail in school and appear to be thoroughly maladjusted and unhappy. A pupil may be able to do his work from a strictly intellectual standpoint, but prove unwilling. He may be so harassed with his personal and social difficulties as to render fine mental equipment practically useless. All this, of course, is a problem for the psychologist and the psychiatrist. Only in the best of school worlds will a child fully utilize whatever mental power he may possess. Nor should the school spend all its efforts trying to change the boy or girl. It is always possible, for example, that the teacher herself precipitates child difficulties with consequent failure to learn (see, for example, the work of May *et al.*⁶).

5. Proper Enrichment of Experience as a Means of Growth

The general implication of all past work upon the nature of intelligence and its development in the individual is that one should work toward the enrichment of school and home life rather than toward coaching or training in specific abstract matters presumably related to an increase in ability. There is no evidence that any form of coaching, memorization, or specific practice will strengthen the child's central ability. If it is desirable to accelerate mental growth in children, the attempt should be made through providing a life in which he prospers generally. Thus, language, which is undoubtedly the most important tool in the development of the intellect, cannot, so far as is known, be enriched by the simple act of memorizing so many new words per day. Rather it appears that the child may be placed hierarchically in such

⁵Joseph Clarence Dewey. "A Case Study of Reading Comprehension Difficulties in American History." 5 vols. (State University of Iowa, Unpublished doctoral dissertation, 1931. 1983 pp.)

⁶Hugh Hartshorne and Mark A. May. *Studies in the Nature of Character: Vol. I. Studies in Deceit.* (The Macmillan Co.: New York, 1928. 414; 306 pp.)

situations that he will need a more and more elaborate system of verbal concepts. He will then be prepared to take on these concepts, and if they are given to him consistently with his inner growth and need, the process is suitably completed. The supplying of these needs through increasingly subtle symbolic mechanisms should be one of the primary concerns of the school.

Whatever has been accomplished thus far in this direction may be regarded as a product of chance and practical experience. Curricula have been pitched to the observed rate of child progress in rather gross, massive terms, such that the extremes of talent at both ends have suffered undue limitation through a failure to realize all potentialities.

IV. EMOTIONAL AND SOCIAL DEVELOPMENT: THE CHILD AS A PERSONALITY

Emotional patterns of course develop simultaneously with mental capacity. Only for purposes of description and analysis can one separate from the earliest composite pictures of child behavior such factors as intelligence, emotion, social behavior, and personality. In a broader sense, all these patterns may be considered *mental*, since we do not mean by the term 'emotional' simply physical and physiological development.

Cannon defines an emotion as "a condition that moves us." Emotional responses are complex reactions involving the whole organism. At the present time their development can be sketched only roughly. There is considerable evidence that the early responses are relatively undifferentiated. The child shows pleasure in being with persons, in going toward them, and in exchanging gestures, words, and touches. Conversely, with other objects or persons, or perhaps under other conditions of readiness or approach, the child shows withdrawal or 'fear': he shrinks, cries, runs. Fairly early in the preschool years the rage pattern, involving the full-blown tantrum familiar to parents, can be distinguished from fear or withdrawal patterns.

However, it is clear from the evidence of research that even in regard to the so-called 'instinctive reactions,' which have long characterized the race and are given to the lower animals, we are in no position to state precisely that the emotions are thus and so, giving them names, dates of appearance, and form of external expression. The old fixed lists of descriptive titles have tended to disappear, for we now recognize that the finer shades of description, while possibly of some practical value, are not basic. How a particular pattern will develop will depend

largely upon the dynamics of the surroundings in which the child is placed, and upon the successes or failures that attend his various experimental trials and responses.

One generalization that may be allowed and that is of particular interest to teachers is that emotional involvements tend to alter significantly the usual behavior pattern of the child. Thus, in anger, there will be an intensification of certain responses observable to those familiar with his modal or customary reactions. These changes may be detected in the overtones of the voice and in its loudness, together with facial distortion, and changes in heart action and muscle tonicity. With instruments and experimental set-ups one may get a fairly accurate report of what is going on physiologically.⁷

In terms of self-protection emotional behavior may mean simply that the organism, through various physiological processes, is preparing itself against an attack; it bristles. Thus moved, a child in anger loses his inhibitions, his common sense, his sense of proportion. He may attack other children even though they are larger than he is and have been much feared; he may even attack the teacher or principal. But here words are more likely to carry the burden of aggression. He may, and frequently does at all ages, attack inanimate and irrelevant objects, scratching, biting, kicking, pulling, thumping, and berating as his excessive energy drains off. On the other hand, if the withdrawing pattern predominates, he tries to run away and hide, to avoid contact, to become pale and speechless, or even to grovel in complete submission.

It is only when the child, perhaps by gradual degrees and with no conscious purpose, has shifted his habitual behavior toward one or another of these extremes that other children, and parents and teachers as well, tend to label him according to his temperament. Thus he is looked upon as stable and good-natured if he rarely goes to either of these extremes but manages to maintain a relatively even tenor. Among children from the preschool age up through adolescence such evenness is not common and should not be too highly regarded. For example, it would prove no great virtue for a young child to be devoid of anger, for the chances are that such a pattern would not really be angelic, but rather indicative of a certain basic dullness or phlegmatism in his social make-up.

⁷ For a brief and very readable account of this by a recognized authority, see Walter B. Cannon. "The significance of the emotional level." *Scientific Monthly*, 38: 1934, 101-110.

After all, we do not want an unresponsive child, but rather one whose mechanism is at least capable of a range of emotional response from extreme fear to extreme anger. In such a mechanism, as with a fine violin, we have the possibilities of developing richness and charm, without which basic life patterns would be exceedingly dull. This has a bearing upon the teacher's concept of discipline in the school. Wickman's investigation⁸ showed conclusively that teachers tend to be sensitive to certain forms of emotional aberration and almost insensitive to others. They are quick to note attacks upon their own ego as expressed in cheating, lying, whispering, fighting, and obscene note writing, all of which in the child is likely to be an emotionally tinged rebellion against frustration. But they are not nearly so likely to note activities, also emotionally tinged, that lead to withdrawal on the part of the child, such as excessive day-dreaming, shyness, and morbid sensitivity to social contact. If pressed by environmental demands, these withdrawing children would show responses as destructive of personality and adjustment as any displayed by the most rebellious and delinquent elements in the class. Later on, away from the sheltering atmosphere of the schoolroom, when they are placed upon their own responsibility, we may get the emotional shattering that comes when the child's world of dreams is brought into sharp conflict with a world of reality and achievement, of social contact and social expectation. Certainly no one would say that the emotional patterns out of control and leading to delinquency and crime are worse than the emotional patterns similarly out of control leading to neuroses, psychoses, and suicides.

Since at the extreme of either withdrawal or attack, elaborate, intensive emotional patterns are hostile to adjustment, and futile or even dangerous in their social outcomes, it might appear that we should do everything possible from infancy upward to protect the child from such stimulations as push him toward the abnormal. As a general principle this is sound, but we know from hard experience that it cannot be done by any preaching of the virtues, or by demanding of each individual child a saint-like devotion to some narrow central line of incipient or highly controlled bodily responses.

It is all a matter of degree and balance. The test of maturity in an emotional pattern such as anger is two-fold; that it becomes a less fre-

⁸E. K. Wickman. *Children's Behavior and Teachers' Attitudes*. (Commonwealth Fund, Division of Publications: New York, 1928. 247 pp.)

quent and a less severe response, and that nevertheless it is brought forth upon appropriate occasions. Any adult who, upon slight, unintentional physical injury by another responds with violent emotion may be considered dangerous to himself and to society. Or, more precisely, he may be considered emotionally immature. But let us look at the emotional response that comes in reaction to criticism, active or implied. By the time of adolescence, we may expect the child to get over the first stage just mentioned; he will be rather magnanimous about such physical hurts when they are obviously unmeant. But he will not be serene at all about criticism, for in criticism lies an attack upon his personal and social status, and this he is painfully trying to build up in a world that is essentially adult. In fact, a non-emotional reaction to criticism, even among friends, will have to be placed very high in the scale of emotional adjustment. To use some good American slang, few people "can take it."

It becomes then one of the great tasks of education to encourage children in their work and play at school, at home, in gangs and in clubs; to move them upward toward the postadolescent level of emotional maturity. And the time is ripe to expect them to surpass what has thus far been accepted as adult adjustment. With new educational facilities and clear insight by teachers we may now expect a degree of objectivity about such emotionally charged areas as physique, mentality, achievement, and parent-child relations as has hitherto been rare in the average adult.

This is worth working toward. In his failure to achieve this higher, more uncommon form of maturity, the adult paves the way to great unhappiness. What the school expected of him as a pupil early became charged with heavy social weight. After all, were not the teacher, the curriculum (which, like the legal corporation, is almost a person), the administration, the school board, and the parents themselves all involved in an elaborate conspiracy to hold him to certain tasks that they had set up for him? If through mental or other deficiency, or merely a feeling of inferiority supported by early failures or disillusionments, the child found himself unequal to this task, the whole course of his intellectual life was changed, and with it the fundamental setting and direction of long-time behavior patterns.

The conditions for such early deviation and steady reinforcement are all about us. They lie in such massive factors as differential physique, intelligence, economic status; in the existence of minority groups

and factions that invite criticism or persecution. Surrounding everyone from preschool age upward are innumerable opportunities for the development of violent emotional patterns that are 'abnormal' only in the sense that they do not help in adjustment. It is a part of the educational process, and an essential one, although long neglected in many schoolrooms, to strengthen the child's basic satisfactions; to offer guidance, affection, sympathy, and emotional outlets; to help him work toward the amelioration of existing defects and impoverishments, while resolutely turning away from the unreal, the irrational, the irremediable.

The anger then may not burst forth upon any and all occasions. It becomes a tool, even if a dangerous one. Similarly with the fear response. There seems to be no human way to eliminate it entirely, for the physical mechanism is there and we live in a fearsome world involving accident, disease, and malicious attack. But a child's general responses, in spite of internal fear reactions, can be made 'right' and socially useful. A good illustration of this comes in the seeking of sympathy or aid from others who are socially-minded. Here the child in a sense binds himself to others, either informally, as among companions and friends, or ritually as in gangs, clubs, teams, and institutions. He learns to recognize a like-mindedness not only of the intellect but of feelings, emotions, and human needs as well. He learns that others, too, have fears, depressions, angers, and hatreds. Gradually he is able to steady himself in the midst of his surroundings, locating what for him is an effective modal point about which he may safely revolve. He observes that what would be a highly emotionalized condition for one person may be rather commonplace for another, and that such differences relate to whole groups of persons living under differing traditions or social environments.

If everyone learned this, there would be little occasion to say much about it. But it is evident from our cases of 'nervous breakdown' that this lesson, which, like so many others, can best be learned at home and school, has not really been learned at all. We find too many adults who emotionally and socially are adolescents or preadolescents. They still get little social nourishment from others. Yet in school especially, they have had long social contact. The togetherness of children in school is a universal phenomenon—on the physical side. It would appear that in the further attention to the child's basic emotional and social needs would lie the key to an understanding of the child's developing personality—to that all-round, broadly conceived mental life that is the enduring concern of school people.

CHAPTER XXXV

CONTRIBUTIONS TO EDUCATION OF SCIENTIFIC KNOWLEDGE IN MENTAL HYGIENE

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I. THE CONCEPT OF MENTAL HYGIENE

Our present concept of mental hygiene is an outgrowth of a gradual recognition that society is as responsible for the mental health of an individual as it is for his physical or economic health.¹ If we agree that society must take responsibility, then we must inevitably agree that the school as an important social agency must take the leading rôle in providing a type of training that should decrease the frequency of mental abnormalities, with their unfortunate consequences. Mental hygiene implies the utilization of dynamic and constructive forces in orienting a person emotionally and in developing adequate habits, mental attitudes, and personality traits that will equip him to meet the inevitable frustrations and failures later on in life without experiencing mental breakdown. Thus the school is committed not only to adequate supervision of its pupils while it has jurisdiction over them, but also to a program designed to prepare them for a normal adjustment later on in life. The most important phase of mental hygiene involves an orientation of the personality of the child; that is, the development of the characteristics of a normal personality.

II. THE CONCEPT OF PERSONALITY

The present concept of personality is based upon the knowledge that psychogenic forces play a predominant rôle in the development of specific traits. In the past it was believed that the patterns of per-

¹For an excellent discussion of the rôle of mental hygiene, see Clara Bassett. *Mental Hygiene in the Community*. (The Macmillan Company: New York, 1934. 394 pp.)

sonality were determined by hereditary factors and that environment and training were of little value in changing a given pattern. This was reflected in the many theories that postulated the inheritance of given traits and that implied that education could generally be of little value in preventing abnormalities. Specific educational methods were thought to be of importance only for the purpose of alleviating the outward manifestations of unfortunate personality patterns.

With the advent of modern psychological experimentation and observation, and with the popularization of the Freudian concepts, much greater emphasis was placed upon the dynamic rôle of the environment and of education in particular. The emphasis upon the psychogenic rôle meant that we recognized the importance of the training of an individual in developing specific patterns of personality. In this respect the influence of John B. Watson and his followers cannot be underestimated. Watson² showed, for instance, how the majority of fears of children, which had been thought to be inherited, or 'instinctive,' were actually the outgrowth of undesirable training. He showed furthermore that many undesirable methods were employed by parents and teachers without their being clearly aware of their rôle in determining various characteristics of personality and emotion. The Freudian emphasis was in many ways similar to the emphasis by Watson. The Freudians³ showed, for example, how the experiences of a child that may have little significance at the moment may leave indelible marks upon his future behavior.

Many of the difficulties encountered in developing a program for the education of personality arise from our lack of precise knowledge regarding the structure or mechanism of personality traits. Some psychologists believe that each personality trait arises as a separate and integral characteristic, fusing with the other traits through the process of conditioning and learning; others believe that the individual traits we observe are those that break off, as it were, from the main stream of personality and thus are easily recognized. There is a difference of opinion also regarding the relation of personality traits to the process of adjustment. Some believe that personality traits arise only because they are necessary for the individual in his attempts to adjust to spe-

² John B. Watson. *Psychological Care of Infant and Child*. (W. W. Norton & Co.: New York, 1928. 195 pp.)

³ Sigmund Freud. *New Introductory Lectures on Psychoanalysis*. Trans. by W. J. H. Sprott. (W. W. Norton & Co.: New York, 1933. 287 pp.)

cific problems; others believe that the individual traits are biological entities.

Those who believe that personality traits are biological entities have attempted to classify personality into definite categories. Thus, as an example, Jung attempted to classify personality into the introvert and extrovert, and a similar classification has been attempted by sociologists such as Allport, one of whose sets of types is the ascendant and the submissive. Psychiatrists like Kretschmer⁴ classified personality on a biological basis in the belief that the physiological constitution of an individual inevitably characterized the type of personality traits he developed. These traits are said to be modified by environment and training, but their true nature is a reflection of the physiological makeup of the individual.

The conflict theory of personality is postulated by a large number of psychiatrists. According to this theory all personality traits, except those that arise from imitation and conditioning, are determined by the individual's necessity to solve his conflicts. Thus, if a child has conflicts of inferiority, he is likely either to retreat and become shy or else become aggressive in his attempts to compensate for his inferiority.⁵ Alfred Adler, who first systematized the compensatory theory of personality development, further stated that the opportunities of the moment determine the particular manifestation of traits.

From a review of these theories it may be said that the term 'personality' may be looked upon as a concept, just as the term 'unconscious' is a concept, implying mental processes of which the individual is not aware. The outward manifestations of personality are determined by the particular traits of this complex pattern that come to the surface as a means through which the individual believes he is adjusting to his environment. He may be unaware of the method of his adjustment. Thus, for example, a child may be dishonest because he (unconsciously) believes that he is obtaining security or success in that way. The observer must, therefore, investigate, not only the dominant traits of an individual, but also the underlying problems that force given traits to the surface and submerge other traits.

Thus the instinctive basis of human behavior, which psychologists and educators considered as factual some years ago, is now looked upon

⁴Ernst Kretschmer. *Physique and Character*. (Harcourt, Brace and Co.: New York, 1925. 266 pp.)

⁵See Mandel Sherman. *Mental Hygiene and Education*. (Longmans, Green & Co.: New York, 1934. 295 pp.)

by the experimentalists in a very different light. The majority of psychologists do not believe that man inherits instincts such as are found in lower animals. The universality of much of man's behavior can be explained upon the basis of universal social backgrounds and upon the common implications of competition and social pressure. Sociologists have shown, for instance, that social pressures are of importance for personality development even at a very early age. The pioneer work of W. I. Thomas upon the personal problems and conflicts of immigrants and the observations of Thrasher, Shaw, Glueck, and others upon the cultural factors influencing delinquency showed the extremely important rôle of the environment. Similarly, Dunlap, among the psychologists, and Alfred Adler, among the psychiatrists, emphasized the rôle of experience and training in the development of various emotions and characteristics of personality. Indeed, even the growth of intelligence has been found to be influenced by environment and education to a much greater degree than was formerly believed.

III. THE DOCTRINE OF FUNDAMENTAL DESIRES

As a way of avoiding the use of instinct in explaining the common behavior of man, a number of sociologists and psychiatrists postulated the existence of fundamental desires. These desires (the terms 'urges,' 'motives,' and 'wishes' are employed as synonyms) develop because of the various cultural and social pressures that begin to influence the individual during early childhood. The physiological drives and appetites that appear in infancy are submerged or greatly modified by these psychologically oriented desires. Inherent desires have been helpfully classified by W. I. Thomas into the desires for recognition, for security, for response from others, and for new experience. Thomas, as well as many other observers, emphasized the importance of the training program in determining whether these desires will be attained in a mentally healthy way or whether they will be achieved in a mentally abnormal way.

1. The Desire for Recognition

The desire for recognition is of special importance to educators. In a socially competitive society everyone desires some form of recognition. This is seen, for example, in the reactions of the young child towards his brothers and sisters and towards his parents. The problem of the attainment of recognition becomes increasingly difficult to the child when he enters school. It is at this period that principles of mental hygiene should be emphasized in the training procedure. Many

children attempt to continue in the school the mode of obtaining recognition that they developed at home. The frustrations they then meet from the other children may cause them either to continue their ego-centric behavior at an increasing tempo or to retreat from the situation. In either instance unfortunate personality patterns may become fixated. Many difficulties arise, especially at the adolescent period, from the inability of many children to obtain recognition. A few may obtain recognition through superiority in sports; a few may obtain prestige through scholastic success; and some may be able to obtain prestige and recognition because of certain characteristics that are held in high esteem. The majority, however, have very few means of obtaining attention and recognition. Psychologists have observed that it is during the adolescent period, when the child first begins to break away from his dependence upon the home, that peculiar and abnormal behavior is frequently seen. It is at this period that identification with the parents is no longer as strong as it had been formerly, and the child, therefore, does not have the security to which he had been accustomed. The attempt of the school to make him independent appears to be a further threat to him. In an attempt to obtain some form of recognition and attain security he is likely, for example, to join gangs or to take part in anti-social behavior. The joining of gangs allows the adolescent who has a sense of insecurity to attain security because he is accepted in the group as an equal and because he attains an 'important' position in the community as a member of this gang.

2. The Desire, or Drive, for Security

The more competitive the environment, the more important becomes the drive for security. In an environment with little competition and few choices of activity, security is a relatively unimportant problem. During the educational process, competition naturally becomes more intense and conflicts of insecurity are, therefore, more likely to develop with increasing age. This may be the reason, for example, why many mental breakdowns occur during the adolescent period when the child no longer is as completely sheltered by his parents as he had been previously and when the competition of the school, together with the necessity for planning for the future, become immediate and serious problems.

3. The School's Stress on Success

The emphasis in the educational system upon success has been considered by many observers to be one of the most serious problems for

mental hygiene. Frequently the only method of obtaining recognition and attaining security is through success. The school has always fostered the belief of the individual in the possibility of his obtaining complete success in one direction or another. The result is that, not only is he unprepared for possible failure, but he is also influenced to believe that he will inevitably attain complete success somewhere. This makes him unusually sensitive and alert to real or implied criticism. There is no doubt, for example, that a neurotic condition that is, at least in part, an escape from frustration into symptoms of disease is due to the individual's inability to face the possibility of failure realistically. It might be exceedingly important, therefore, to institute educational procedures for the development of constructive attitudes towards success and failure. In other words, every child might be prepared to fail; that is, might be prepared to face failure without the neurotic consequences that so often follow.

Not only are neurotic symptoms likely to follow the inability of an individual to realize his desire for success, but he is also liable to develop all sorts of abnormal personality characteristics in his attempt to obtain recognition and security when he believes he can not do so through success. Psychiatrists have shown, for example, that recognition and prestige are generally obtained either by superiority to others or by differentiation from others. Thus, if a child can excel in athletics or in scholastic ability, or can identify himself with his parents who may be more important, he obtains recognition and prestige. If he cannot obtain recognition through superiority, he unconsciously attempts to differentiate himself from the group, in part because he can thus deny the importance of the others and in part because he can thus draw attention to himself by being different. There is no doubt, for example, that many unusual characteristics, abnormal and anti-social, are unconsciously developed in the attempt to obtain recognition. The child of ten who refuses to abide by the school regulations or who is anti-social, frequently obtains from his fellow students a great deal of attention that he could not obtain in ordinary ways.

Recently a number of observers have pointed out the possibility that the academic failures of many intelligent children may be due to their unconscious desire to fail, attaining thereby a status that will produce attention and sympathy from their parents. Their inability to take responsibility for themselves and to attain independence causes

them to regress in their emotional and intellectual behavior to a symbolic level that reinstates their childhood relationships. It seems, therefore, that one of the mental-hygiene functions of the educational process might be to develop in children an ability not only to face the possibility of failure, but also to make choices in which they will take complete responsibility. Much has been said, for example, about the failure of the school in developing children for effective citizenship during adulthood. From the psychological standpoint, effective living requires that the individual be able to form attitudes and to make choices on the basis of a reasoning process. Unfortunately, however, the attitudes that most adults form are based upon emotional problems involving personal security. Intelligent behavior without emotional involvement is only infrequently seen in the personal and social relations of man.

4. The Nature of Intellectualization

The process of intellectualization probably takes three forms:

a. Reasoning. In reasoning, the individual responds by a deliberate premeditated evaluation of the facts involved in the given problem with the minimal amount of emotional influence. This type of intellectual response is seen most often only when the individual reacts to problems little related to his security or integrity. One may respond by reasoning to a non-personal problem, but it is difficult, indeed, to respond in this way to a personal problem that involves one's status or security. Under such conditions emotional reactions and a variety of attitudes interfere with factual reasoning.

b. Dissociated Intellectual Activity. This form of intellectualization is exceedingly common. Rationalization, for example, is one form of dissociation. Rationalization involves the submergence or suppression of the true facts. The individual explains his behavior in such a way that it sounds plausible both to himself and to others. He is thus able to evade realities, and at the same time to appear to be normal in his everyday behavior. By dissociating his reasons and his attitudes, the individual may retain contradictory beliefs without being aware of the contradictions. Thus he may have a variety of different and contradictory attitudes that allow him to adjust to a variety of diverse conditions.

c. Emotionalism. Instead of evaluating facts and reasons, the individual may respond by strong emotional attitudes. As has already been mentioned, the individual who identifies himself with a particular

group, say, a given political party, negates immediately any facts that tend to bring out the importance of the opposition group. Thus the individual develops many defenses, dislikes, and strong emotional identifications. When necessary, he may attempt to give plausible reasons for his behavior. Actually, most of his reactions are motivated by personal conflicts that he tends to minimize when they are pointed out to him.

Obviously, the infrequency of the reasoning process is due to the inability of the individual to understand his problems or to solve his mental conflicts in a satisfactory manner. Unfortunately, the school only infrequently aids the child in constructively solving his problems and conflicts. Indeed, many educators believe that they should avoid involvement in the personal problems and conflicts of their pupils, assuming that the parents are capable of guiding their children. But, as we have seen previously, the school rightly or wrongly has assumed an important function as a social agency concerned not only with the educational, but also with the personal, welfare of the children. Perhaps, therefore, parents rightly look to the school for personal as well as educational guidance.

The motivation of the child to success, and only success, inevitably leads to innumerable difficulties unless he is also prepared to understand his limitations. The attempt of the school to motivate the child through reward and failure is in many respects a poor method. Rewards may lead in many cases to the expectation of future rewards and failure may lead to conflicts instead of to increased effort to achieve. In regard to many of the other inherent desires, such as activity and the desire for response from others, careful guidance is also necessary.

5. The Desire for Activity

The desire for activity on the part of many individuals in our society is frequently directed, not only toward outcomes that are non-essential, but also toward those that are anti-social and undesirable. The school perhaps should be able to direct the activities of the pupils into useful channels. Children can also be made much more self-sufficient than they are at present; that is, children may be taught to become interested in activities that do not require constant action or persistent relations with others. Consider, for example, the many adolescents and adults who must constantly take part in some overt activity. They must attend a baseball game, or a dance, or a movie, or play

bridge, or what not. Their motivation must constantly come, therefore, from outside sources. Sometimes such overt activity may symbolize escape mechanisms.

IV. BETTER GUIDANCE IN DEVELOPING PERSONALITY

Our schools have made a number of significant advances in guiding the development of the personality of pupils.⁶ As an example, emphasis on competition has been reduced. Many teachers attempt to motivate children to compete with their own previous records rather than with their fellow-pupils. This shift of emphasis has tended to reduce the strain and stress that was so noticeable in the old-fashioned school situation. In many cases it also tends to stimulate the children rather than overwhelm them with the difficulties of competition. The attitudes towards discipline have also been changed. Formerly punishment of one sort or another had been used as the most important element in the discipline of children. Children tended to consider such punishment as retaliative, and therefore tended to become antagonistic and rebellious. The teacher has become a director and leader, rather than a taskmaster and disciplinarian. Most important of all, teachers have learned to consider behavior problems from a psychological standpoint. They no longer classify children as 'good' or 'bad.' Nowadays the problem child is considered a psychologically sick child. These changes have influenced teachers to study their children rather than to mold them to their own liking. Instead of rewarding children for their good behavior and punishing them for their undesirable behavior, teachers tend to study each child's capacities and difficulties and then institute proper measures for his best development. The newer attitudes of teachers are well illustrated in their increased demand for college courses on mental hygiene and child development, and in their increased participation in parent-teacher groups and child-study associations.

With this excellent beginning, it is most probable that still further advance will be made in the reorientation of the school from its former status to a place where each child will be adequately studied and treated from the educational, psychological, and psychiatric standpoints.

⁶ V. V. Anderson. *Psychiatry in Education*. (Harper & Brothers: New York, 1932. 430 pp.)

CHAPTER XXXVI

CONTRIBUTIONS TO EDUCATION OF SCIENTIFIC KNOWLEDGE ABOUT THE ORGANIZATION OF SOCIETY AND SOCIAL PATHOLOGY

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I. VIEWS OF REPRESENTATIVE THINKERS

The subject we are to discuss has had a long history. Almost every social thinker of note has had his own peculiar ideas about education, and every reformer has striven to affect the minds of the young. Plato counselled us as to what should be told to children in a better world, and his benevolent deceptions are with us still. Bacon had a scheme for social amelioration through the collection and diffusion of knowledge. Spencer, like many another crusty bachelor, had decided views as to the upbringing of children. Durkheim, Ward, and Sumner had their own distinctive interpretations of education, and so had many another. We may limit ourselves profitably here to stating the views of a few representative thinkers.

Lester F. Ward believed that self-directed progress was possible.¹ Dynamic action, as he put it, was the means to progress, dynamic opinion the means to dynamic action, knowledge the means to dynamic opinion, and education the means to knowledge. For Ward, the betterment of society must begin with education, and if the initial steps were taken, the others would surely follow. Because of the simplicity of Ward's system of thought and the assurance with which he stated his views, he has probably had a greater influence upon thought in the field of education than any other sociologist. A good deal of current educational theory is pure Ward.

While social scientists have become aware of the extreme importance of education through their study of society and its problems, men

¹ See Lester F. Ward. (a) *Dynamic Sociology*, (b) *The Psychic Factors of Civilization*, (c) *Pure Sociology*, and (d) *Applied Sociology*.

who were principally educators have discovered society in their attempts to deal with the problems of education. As a representative of the latter group, we may mention William Torrey Harris. Harris believed that the philosophy of education should be founded on the new science of sociology. A principal function of education was to transmit and preserve the wisdom of the past. Harris indicated that he had a real insight into the relation between the school and other institutions that performed educational functions.²

In recent years self-styled educational sociologists have appeared who have brought the principles of sociology to bear upon the problems of the educator.³ W. R. Smith, Ross L. Finney, F. R. Clow, and David Snedden were among the pioneers of this group. They brought to their task a fairly good background in sociology and an excellent knowledge of the problems of the practicing educator. Their mingling of common sense, sociology, and education has doubtless had a rather important influence upon educational theory. Snedden, who thought of educational sociology as the discipline that applies the findings of all social science to educational theory and practice, has had a considerable influence through his students. He himself managed to state many problems that he did not satisfactorily solve.

The most influential volume in the field of educational sociology is *Foundations of Educational Sociology*, by C. C. Peters. Its underlying conception of education is that to be educated is to have prepracticed certain responses. Peters has made quantitative studies of wide areas of social life, obtaining observations and judgments as to what should be prepracticed. Peters thinks of the school as having a residual function; the school must teach what other agencies do not. The educator is therefore a sort of social engineer.

A number of others have written books of some value in the field of educational sociology. There is Daniel H. Kulp, who has been deeply

² A recent book that collects and summarizes the sociological contributions of Harris is Thomas Henry Clare. *The Sociological Theories of William Torrey Harris*. This doctoral dissertation at Washington University, published by the author, contains an excellent bibliography, which is especially useful because of the scattered character of Harris' writings.

³ A recent issue of the *Review of Educational Research* (Vol. VII, No. 1; Feb., 1937; edited by C. C. Peters) gives a very thorough review of the accomplishments of educational sociology. This work contains several exhaustive bibliographies. Because of the availability of this volume, our own survey of the field has been much abbreviated.

influenced by Ward; J. K. Hart, the disciple of Dewey; Payne; Tuttle; Good; and Kinneman. These books are written on very different intellectual levels, and are based upon radically different formulas as to the relation of sociology and education. Educational sociologists are not always incisive thinkers; some of them display a deplorable tendency to become a specialized in-group without very good training in either sociology or education. They take their sociology and their education alike from other educational sociologists. One of the writers just mentioned, for example, quotes Snedden for the distinction between heredity and environment.

A new note was injected into educational sociology a few years ago by the famous Report of the American Historical Association Commission on the Social Studies in the Schools.⁴ This committee appears to have been greatly influenced by Counts. The Counts theory seems to be that in framing our educational policy we constantly make choices, and that these choices have a directional trend. By becoming aware of our choices, and by steadily making those choices that will influence the next generation in the desired direction—toward one un-named brand of collectivism rather than toward another form likewise not mentioned by name—teachers may participate in social change. Scholars of this group are interested in social action rather than in social theory. While their sincerity and high purpose cannot be doubted, the feasibility of their plan for social action can hardly be regarded as fully established. Some other volumes of the series, notably the volume by H. K. Beale, *Are American Teachers Free?*, present facts that seem to cast considerable doubt upon the possible participation of the educator in movements of social reconstruction.

Numerous sociologists whose major interests are in the general field have made specific contributions to educational literature. Ellsworth Faris, well known for his contributions to the field of child study, has written some very sound and very provocative essays on education.⁵ Waller, once a student of Faris, has essayed an analysis of school and community and intra-school relationships, and has tried to trace the effects of these relationships and processes upon the personalities of

⁴ See American Historical Association; Commission on the Social Studies in the School; *Conclusions and Recommendations of the Commission*. See also George S. Counts. *The Social Foundations of Education*.

⁵ Some of Faris' best essays on education appear in a recent volume of collected essays published under the title *The Nature of Human Nature*.

students and teachers.⁶ The Lynds⁷ have given us the classic study of a community and incidentally of an educational system within the community. Chapin⁸ has studied education along with other contemporary institutions. E. George Payne and his associates at New York University have made pioneering studies of educational influences in the city environment. Probably the most ambitious program for the application of sociology to educational research and teacher training is that being carried out in Columbus, Ohio, under the direction of Lloyd Allen Cook.

II. EDUCATION AND SOCIAL CHANGE

We now turn to the task of indicating the relation of education to social change and to the solution of social problems. Any such discussion within brief compass must necessarily limit itself to the mere statement of a point of view, and must leave out those elaborations and qualifications so dear to the academic man. Nevertheless, there is a certain value in bringing our thought on this subject to the sharp focus required by a brief paper, and we may perhaps be permitted to hope that this value will counterbalance some of the unavoidable defects of our discussion.

1. Education Defined

At the risk of seeming pedantic, let us pause to define the term 'education.' By 'education' we mean what most people mean when they use the word, the controlled inculcation of selected portions of the social heritage. Let us avoid the nearly meaningless conception of education as a leading out of the tendencies or capacities of the child. Our definition is consistent with the conception of education as a process of setting the individual free from preëxisting indoctrinations and rigidities, for such liberation of the individual depends upon transmission to him of a different segment of the cultural heritage. But education, for us, necessarily has a content, and involves a degree of indoctrination. We may distinguish education from propagandist instruction by the fact that the educative process is to a large degree dominated by the moral obligation to communicate truth.

It is inadvisable to define education as including all the processes that form the character of the child, for if the term is to have any

⁶ Willard Waller. *The Sociology of Teaching*.

⁷ R. S. Lynd and H. M. Lynd. *Middletown, a Study in Contemporary American Culture*. See also R. S. Lynd and H. M. Lynd. *Middletown in Transition: A Study in Cultural Conflict*.

⁸ F. S. Chapin. *Contemporary American Institutions: A Sociological Analysis*.

specificity of denotation we must limit it to those processes that are ordered and controlled with an end in view. Thus most of the 'education' of the child in the family is not education at all; it is merely unreflective and unintended indoctrination of the child with the culture of the parents. The community, likewise, exerts a tremendous influence upon the child, but it rarely educates in the true sense, since it has no purpose and no conception of the adaptation of means to ends.⁹

We hope by this delimitation of the field to avoid certain errors that are almost 'standard' in works that treat of our subject.

The first is the error of irrelevance. One who reads at large in the field of education must often be struck by the fact that much of the literature has very little to do with education in the ordinary sense and nothing whatever to do with the schools. Such literature is therefore of small value to either teacher or administrator; and this accounts for the divorce of theory and practice and the coëxistence of progressive theory and archaic practice.

The second error is closely related to the first. One who defines education in such a way as to include all formative influences is likely to believe that education can make the world over in a relatively short period of time. Education in this broader sense could indeed remake the world, but no one can control it and direct it. In the community at large are thousands of unpaid and unlicensed 'educators' who listen to the orders of no superintendent, and their activities outweigh in importance the activities of the paid educators who teach in schools. The educational activities of such persons could be controlled and directed only if we had already attained an ideal state of society; again we see the force of Woodard's dictum, "The problem of Utopia is not staying there but getting there."

2. The School Is Closely Related to Other Social Institutions

We must begin our discussion with the statement that the school is one of the institutions of society. All the institutions of a society are bound to be closely related, and no one of them can change without some corresponding change in all the others. In a stable society, the activities of institutions are so interwoven that each supports and is in turn supported by the activities of all the others. The church advocates a morality that is quite compatible with the economic order and the

⁹ The broader conception of education has, however, been useful in correcting the characteristic bias of teachers, who are likely to believe that the child learns only in school between the hours of nine and four.

existing government. The government is interwoven with the threads of religion and the prevalent economic ideology. There is nothing in the whole round of family life that one does from love but what it is his duty also, and that duty is defined and enforced by church and state. We may say, if we wish, that this interweaving of institutions depends upon consensus. In the present state of society we move rapidly from one consensus to another, and the intermeshing of institutions is less close than in a simpler and more stable society, but it is still present. When the practices of one institution deviate markedly from the established consensus upon which all institutions are based, social conflict arises that puts an end to the variations or establishes a new consensus.

The school, we say, is one of the institutions of our society, and as such it is bound to all the other institutions. The school, with us, is bound to the mores of Christianity, capitalism, militarism, and individualism. The school, furthermore, is an 'enacted,' as distinguished from a 'crescive,' institution; it is an institution that has been voluntarily created in relatively recent times rather than one that has come down to us from the far-off past. Therefore, if any institution could have the power to vary independently of all the others, it would not be the school but one of the crescive institutions that are deeply rooted in the mores. The public school is not even an institution that exists in its own right. It is the creature of the state and the local community. As such it must play a limited rôle in cultural and social change.

3. Four Social Processes and Four Learning Processes

Most learning processes take place within a social situation. It may sometimes happen, in accordance with classical theory, that the baby burns his finger in the flame of the candle and learns to avoid the flame thereafter, but it usually occurs that the baby's mother is present to interfere with the process. We are justified in treating most learning processes as incidental to social processes. This is particularly true of those controlled, directed, and measured learning processes for which we have reserved the name 'education.'

Within the school, four different kinds of social processes eventuate in characteristic learning processes. We may list these learning processes as (a) learning from formal instruction, (b) learning from informal interaction between student and teacher, (c) learning in the organized primary group, and (d) learning in the unorganized primary group of school children.

a. *Learning from Formal Instruction.* Formal instruction usually consists of the imparting of facts and skills, and it is well adapted for this purpose. The school is organized around this function, which accounts for the autocratic social structure of the schools. Learning results from the interaction of teacher and pupil in accordance with stereotyped patterns, from highly institutionalized and circumscribed social processes. The amount and kind of pupil learning is as much a function of the adaptation of the teacher's personality to the dictates of this social situation as of his technical skill in presenting subject matter.

b. *Learning from Informal Interaction.* By this second category we mean to designate the learning resulting from the interaction of teacher and pupil that is not a part of the formal instructional process. Teachers and pupils react to one another as human beings even in the classroom. During their long hours together they love and hate and aspire to other things under the eyes of the supervisor, and they teach and learn a thousand things that have nothing to do with the rules of grammar or the multiplication table. Children acquire from their teachers taboos, class attitudes, disgusts, and avoidance reactions that are not in the curriculum. Sometimes, too, they are influenced by the complexes and other neurotic manifestations of teachers whose mental hygiene leaves something to be desired.

c. *Learning in the Organized Primary Group.* The importance of teacher-dominated organized groups of children in the educational process has increased notably in the past generation. In the well conducted school of today there are many clubs, teams, and other associations that carry on approved extra-curricular activities, usually in the school building after school hours. Under the guidance of skilled supervisors, these groups may combine the advantages of unfettered participation and of directed activity. The use of organized activities groups is felt by many to be one of the great educational inventions of our time.

d. *Learning in the Unorganized Primary Group.* The unorganized, or self-organized, primary groups of schoolchildren are among the important formative influences of the child's life. Because they tend to develop their own purposes, which are often at variance with the purposes that the elders would like to impose upon them, these groups often interfere with the formal educational processes of the school. Such groups have their own culture, and with their separate culture

they constitute an area of social living to which the adult is rarely admitted. Nevertheless, with their in-group morality, their tribal loyalties, and their give and take of spontaneous interaction, these groups make an indispensable contribution to the development of personality. Primary groups of the sort are stair-stepped as to age, and imitation always runs upward in the age scale. Activities groups are in constant danger of developing special purposes of their own, and thus becoming true primary groups with purposes at variance with the institutional purposes of the school, or of becoming merely an adjunct to the formal order of the school.

Of these learning processes only the first and third can be sufficiently controlled so that they can properly be called education. Control over the other sorts of learning is largely of the repressive sort. It is the task of school administration to blend these learning processes in such a way as to satisfy community pressures upon the school and at the same time to furnish for the child a rounded educational development.

The social processes and concomitant learning processes of the school are interwoven with the social processes of the community and the larger society. The school is neither independent nor completely dependent. What takes place in the school is of a piece with what takes place outside of it. Whatever happens in the world must have its repercussions in the world of school, and whatever the child learns in school he must certainly apply outside. There is, of course, often a time lag between changes in the greater world and those in the smaller world of school.

4. The Part Played by the School in Certain Major Social Processes

Let us attempt to place the school with regard to some of the more important processes of interaction in the larger society. Space is lacking for treatment of all the social processes that are important in this connection or for the exhaustive treatment of any one, but we may be able to illustrate a type of analysis fairly effectively.¹⁰

a. *The School in Various Cultural Processes.* 'Culture' is here used to denote the whole of the social heritage, to designate that which is

¹⁰ The omission of formal social processes such as communication, competition, conflict, accommodation, assimilation, and the like may seem particularly unfortunate. These processes ramify so extensively that it would be impossible to deal with them here. I have made extensive use of these concepts in *The Sociology of Teaching*.

socially, rather than biologically, transmitted from one generation to the next. The culture of any group grows in two ways, through invention and through borrowing from other groups. Most culture traits have been invented but once and have been diffused to other groups. Another important cultural process is the transmission of culture to the new generation. We may think of the schools as playing a certain part in the invention of new culture traits, a somewhat more important part in the diffusion of culture, and a very important part in its transmission. These cultural functions naturally receive a different emphasis in different kinds of schools.¹¹

The culture of a stable group tends to have a high degree of integration. Present-day American culture is characterized by the opposite phenomenon, that of culture conflict. Immigrants of many kinds have brought their diverse heritages to our shores. Our institutions have been torn down and rebuilt on successive frontiers, and the rapid changes of recent times have juxtaposed old and new patterns of behavior. Our educational institutions necessarily reflect this cultural heterogeneity.

In the elementary and secondary schools, the transmission of culture predominates over all other functions. The culture that is transmitted is, of course, merely a small segment of the total culture, but it is a segment that is considered particularly necessary for social living and peculiarly fitted for classroom instruction. The content of education on the elementary level is mostly facts and skills of a non-controversial sort and of a very tangible nature. These elements of education are chiefly instrumental in nature. Some attempt is made to indoctrinate with the basic attitudes of the life of the group, but this indoctrination is limited to a relatively small number of points.

We must emphasize the point that the content of the curriculum is only remotely influenced by those considerations of public policy that have weight in the textbooks concerning the curriculum. The content of the curriculum is determined by the interaction of interested groups that make conflicting demands upon the school. The limitation of the schools to non-controversial elements is a result of the cultural heterogeneity that produces these conflicting and irreconcilable demands. The curriculum is in fact a compromise acceptable to all parties but satisfactory to none, a tissue of 'accommodations.' Conservative elements are apt to weigh heavily in such compromises, so that education

¹¹ An interesting classification of colleges can be worked out on the basis of the relative importance of these functions.

tends, it would seem, to catch up and pass on rationalizations and justifications of the *status quo*.

The four types of learning processes that we have distinguished are related to the transmission of culture in the following ways:

(1) The formal instructional processes of the school are adapted to the transmission of the officially delimited curriculum. This includes those segments of the culture that are acceptable to groups in conflict, and also those parts of the culture that are sufficiently recognized and verbalized to enable them to be transmitted in this way.

(2) A great deal of the culture is transmitted through informal learning. We have already implied that the curriculum is obviously limited to the verbalized culture. There is a great deal of our culture that we pass on unreflectively; we participate in it and expect our children to participate in it, though we are not for a moment aware of its existence. This is the un verbalized culture, and it includes some matters of vast importance. We are apt to overlook this part of the culture in our discussions of learning processes, because these are things that the child learns without anyone intending to teach them to him. This culture is incorporated in personalities, and the personalities of the adults form the personalities of the young in accordance with the necessities of situations that these adults set up. In the school, the child learns from what the teacher says, and also from the way in which he says it; he learns from the teacher's gestures, from the tone of his voice when he speaks of certain subjects, from his withholding of comment on certain subjects, from what the teacher does not do and persistently refuses to notice. In this manner the child acquires some of the most important elements of our culture.

(3) The so-called 'activities groups' are the best examples of the organized primary group in the school. Sometimes these activities groups are used to stimulate interest in the formal content of the curriculum. Sometimes they are used to give certain sorts of training that are ill-adapted to the classroom. It is interesting to note that the competitive atmosphere of some of these activities groups approximates the world into which the child must enter much more closely than does the classroom situation. For this reason, many college students who desire success more than learning have eschewed the wisdom of the classroom and betaken themselves to activities groups for their training.

(4) The learning in the spontaneous primary group of school children pertains chiefly to the specialized culture of children. This culture seems to serve a necessary purpose in inducting the child into the adult

world by easy stages. The stair-stepped character of primary groups of the sort furnishes a powerful motivation far more dependable than that which is generated by the social machinery of the classroom.

Invention of culture may be disregarded as a function of the elementary and secondary schools, although it may be argued that the relatively non-rigid type of subject-matter presentation now in vogue will probably make possible a greater rate of invention in the next generation. Diffusion, within limits, is clearly a function of the school. The teacher is in a sense a martyr to cultural diffusion, for he must ordinarily have received his training in a community and an institution somewhat more advanced than the one he is permitted to serve; this is one reason for the widespread discontent of the profession. Processes of diffusion in the schools take place geographically from one area to another, and also include diffusion from one social class to another and from one culture group to another. In the schools the dominant culture complexes of American life tend to overcome and replace regional cultures and other sub-cultures.

b. The School and Social Classes. One of the most important facts about modern society is that the population is separated into social classes that are differentiated from one another by such facts as ancestry, wealth, occupation, and education. One of the most ramifying sociological principles is that persons on different class levels are almost universally trying to maintain their position in the class structure or to improve it by rising to a higher class. The facts of social class are interwoven with all other social institutions and social processes. Naturally, they affect our educational institutions profoundly. We shall discuss in particular the relation of education to change or attempted change of social class.

In every society some persons rise in the class structure, while others descend; that is, there is some vertical mobility, or *mobility of class*. Whenever the son rises above or falls below the position of the father, whenever the daughter marries unusually well or badly, we may say that there has been mobility of class. Because it is usually the able who rise and the stupid and inept who descend, we sometimes speak of this process as the circulation of elites. The movement of persons from class to class is an explanatory principle of value in a wide area of social phenomena; it helps to explain one aspect of the eugenic problem, the failure of the competent to reproduce; it is a factor of importance in political stability, for free movement prevents revolution and stoppage of circulation may cause it; it explains insurance, debutante parties,

conspicuous waste, the emphasis upon 'front' in city life, and the struggle to 'keep up with the Joneses'; it chains the commuter to his dismal routine, and fills the coffers of national advertisers; it also helps to determine educational policies. The efficiency of social institutions depends to an enormous degree upon selective agencies, which operate through personal competition to fit the abilities of men to their level of functioning; for this reason a society with open classes is likely to be more efficient than a society in which one's social function is determined by hereditary status.

Although there is some mobility of class in any society, the amount and kind of mobility vary widely. In the United States of a few decades back, mobility of class was high. There was free land and a frontier where a man might make his fortune. New industries were forming to exploit the virgin resources of a continent. Great wedges of immigrants came into the country every year to force the native-born upwards. For these and other reasons, there was a period in which it was nearly inevitable that the thrifty American family should rise in the world. It was natural that in such a society people should adopt a basic philosophy in which every man tried to get ahead and every man worked for himself alone. The main chance lay in the direction of improving one's position in the existing society rather than in improving the conditions of one's class or the conditions of all classes in society. Although this America passed out of existence somewhere around the turn of the century, this is still the basic American philosophy.

A society of open classes is always in flux, but it has its own inherent sources of strength. As long as a strong man is able to rise in the world, there is not likely to be a revolution, because all those who are able and aggressive stand to gain under the existing scheme, and the others do not count. Likewise a society that everyone supposes to be a society of open classes is stable—whether this opinion is well founded or not. Schools must therefore teach that the United States is truly a society of open classes, although today many informed persons believe that the main chance for the ordinary individual is no longer that of rising in the world through thrift and initiative but that of changing the distribution of income and power among the social classes through mass action of some sort. There is a great deal of pressure upon the schools to perpetuate the older philosophy.

Education, especially higher education, has been adopted by great masses of people in the last two decades as a means to social mobility. It may be doubted whether it will prove to be very effective. It is true

that statistics based upon graduating classes of earlier periods show that college graduates have relatively high average incomes, but it is open to question whether this is due to the college education or to the high ability and the family resources that made the college education possible. It should also be remembered that the college graduate of 1900 did not enter the world of the 1930's. In spite of these facts, a principal justification of higher education continues to be the statement that it helps individuals to get along in the world. Interesting questions of values arise from the policy of taxing the general public in order to help individuals to improve their social and economic position, and the problem becomes even more complex when we reflect that this representation is possibly false.

Education may also be viewed as a selective device that, through its competitive processes, discovers persons of high ability and fits them for positions functionally important in the social order. To an extent, education in America does this, but it falls short of ideal performance. Opportunity is not really equal for all. Negro education, for example, is exceedingly rudimentary. Children of poor parents have little opportunity to continue schooling for extended periods. Expensive private schools provide unusually good opportunities for the children of rich parents. The educational machine does, however, operate rather effectively to exclude from upper educational brackets and upper positions persons who are markedly lacking in intelligence.

We may relate the different types of learning processes to class and mobility of class in the following ways:

(1) Formal education equips the child with certain facts and skills that are supposed to be useful to him in the competition for a place in society; some of these skills are indispensable to the acquisitive life and others are of doubtful value. The curriculum also contains much material supporting the belief that it is possible for the individual who starts with nothing to rise in the world through his own unaided efforts. There is an abundance of success stories from the past, and a complete lack of information concerning the distribution of income at present.

(2) The learning that takes place in unpatterned interaction has also considerable relation to the processes of social mobility. Teachers are predominantly lower middle class persons, and they inevitably pass on a considerable number of the attitudes of their class: implicit belief in the efficacy of individual enterprise, admiration for those who have succeeded and prejudice against those who have not, the social and economic quietism of their class. Teachers are sometimes used as

models of imitation, particularly by children of lower economic groups.

(3) The activities of organized groups furnish excellent training for competition in society and also indoctrinate children with the philosophy of competition. Mobility in these groups is much quicker than in the larger society, and they therefore give the individual some encouragement to attempt mobility later.

(4) Primary groups of school children are likely to be split along class lines and to indoctrinate with the class principle, but not with the doctrine of mobility of class. Occasionally some individual who has gained a great deal of status in one of the activities groups is able to gain satisfactory standing in a primary group on another level, and this furnishes him with an excellent incentive for attempted mobility in later life.

5. The Part Played by the School in the Solution of Social Problems

We have indicated briefly the type of analysis that should be made in order to place the school with regard to the major processes of becoming in our society. There are many other processes that would be worth consideration; we have merely attempted to illustrate a few applications of sociology to education rather than to cover them all.

We must now touch upon the question of the relation of the school and its educative processes to social problems. What part does the school play—what part can it play?—in the solution of social problems?

Although we often speak of 'social problems,' we rarely use the term in any exact or definite sense. L. K. Frank has defined a social problem as follows: "A social problem, then, appears to be any difficulty or misbehavior of a fairly large number of persons which we wish to remove or correct, and the solution of a social problem is evidently the discovery of a method for this removal or correction."¹² In a recent paper,¹³ I have essayed an interpretation of social problems based upon Frank's earlier discussion. In order to understand social problems, we must realize that an attitude toward the phenomenon is contained in our concept of it; problems are only problems because we define them as such by our own value judgments. Social problems are moral problems; from first to last they are marked by the conflict of moralities and by the strain for consistency in the mores. The conditions that we regard as problems arise from the basic organizational mores of our society

¹² L. K. Frank. "Social problems." *Amer. Jour. Sociol.*, 30: Jan. 1925, 463.

¹³ Willard Waller. "Social problems and the mores." *Amer. Sociol. Rev.*, 1: Dec., 1936, 922-933.

and are defined as problems in terms of the moral imperatives of humanitarianism. Those organizational mores from which the conditions regarded as undesirable arise are likewise operative to obstruct or circumscribe our attempts to remedy these conditions. Even the humanitarian must pay allegiance to both the organizational and the humanitarian mores. We see, therefore, that progress in dealing with social problems must necessarily be slow. The general trend of this analysis would certainly indicate that the educator must work within rigidly established limits as an advocate of social change.

At the present moment, there is a strong and ably led group of teachers who would like to participate in social change in a more fundamental way than teachers have found it possible to do in the past. We have already indicated the nature of the limitations within which they must work. There are, however, certain factors that operate to give the teaching group a limited degree of autonomy. We might list the more important of these factors as follows:

(1) The ignorance of the public as to what actually goes on in the schools. Always a factor of importance, this factor is at its height in large cities where teachers instruct the children of foreign-born parents who are unfamiliar with American traditions and without standing in the community. It is of least importance in the rural community or the residential suburb.

(2) The power of the teaching group and its traditions. Any institution, once established, tends to develop a degree of autonomy, largely because its functionaries, responding to the imperatives of that particular institutional situation, develop their own traditions, which they obey. This is notably the case with the law, and to a lesser degree with the school. Unfortunately for those who desire education to be a progressive force, the influence of the teaching group is usually exerted on the conservative side.

(3) A most important basis of autonomy for the teaching group is the fact that the conflicting demands of pressure groups create an area of objectivity. In the case of religion, for example, instruction in it was dropped from the schools not because of any lack of religious sentiment in the American people but because different groups could not agree as to the type of instruction to be given. The result was that the secular character of instruction in the schools probably hastened the trend away from the church and its moralities—something that was probably not contemplated by any of the original pressure groups. It seems likely that other areas of objectivity will soon be created concerning such

questions as the rights of labor, the meaning of the constitution, the place of the public utilities in the social order, and the proper interpretation of nationalism. If it so happens, the school teacher will be free to omit partisan statements on these topics, and perhaps to present certain facts objectively. This seems to be the teacher's most favorable opportunity for participation in social change under the present order.

Certainly we cannot answer the question of the place of education in social change in simple moral terms. When the culture is confused, the minds of men are confused, and no one can be sure of himself. The author of a recent book comments unfavorably upon the hypocrisy of teachers and school administrators. He says: "In moments of despair one feels like shouting, 'Hypocrites, hypocrites.' The worst of it is the teachers most guilty of it would be insulted and sincerely amazed at the epithet."¹⁴ Beale fails to see that in a time of culture-conflict some hypocrisy is bound to appear, and that it has its uses. Often the school administrator is as honest and progressive as he dares to be. If he dared more, he would lose his position, and there is the possibility that his place would be taken by someone who would please the reformers even less. The administrator is caught by the inevitable paradox of social reform: The good man cannot reform society and the bad man will not.

III. FUTURE POSSIBILITIES

Nor is social science the answer. We sometimes hope that when we get a true social science the problems of the world will be solved, but there is no reason to believe that this is true. Science is instrumental, and the scientist does not and cannot decide for the good or for the evil side. He merely keeps the score. The results of social science to date have been applied by our commercial and militaristic culture for ends of which most humanitarians do not approve. Will the situation be different when our science has become more exact and penetrating?

In the end, we can say only that we do not yet know what consequences our educational system may have. We see some of its immediate and more or less intended consequences, but we do not see the consequences of these consequences. Precisely because of the instrumental character of most education—because it gives skills that may be used for any end—because it does not and cannot determine ends—there is reason for hope. We do not know where universal literacy may lead us, and it is still too soon for despair.

¹⁴H. K. Beale: *Are American Teachers Free? An Analysis of Restraints in American Schools*. P. 777.

CHAPTER XXXVII

CONTRIBUTIONS TO EDUCATION OF SCIENTIFIC KNOWLEDGE IN ECONOMICS

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I. THE ECONOMIC FACTORS THAT CONDITION EDUCATION IN ANY SOCIETY

Economic factors condition the amount and type of education that will be provided in any society. In a very poor society where practically all the time and effort of people must be spent in obtaining food, little effort can be spent in providing education. The result has been that in all societies prior to about 1900 education had to be confined to a relatively small group of the population. Elementary education had been provided on a more or less universal basis for a few hundred years in some of the more advanced cultures. Beginning about a generation ago, our own society began seriously to consider secondary education for the whole population. We had the margin of economic energy to provide it, and our machine technology was becoming so efficient that it was no longer necessary to make even adolescents work in fields or factories.

The changes in economic productivity that made possible the extension of secondary education on a very wide scale forced profound changes in the nature of education. If all children are to stay in school, there will have to be a much broader conception of education than that which existed in earlier days. Much of the scientific investigation in many fields in education has been in the effort to find a broader base for education and to determine what should be taught to this larger group now entering our schools. Much of the movement leading toward the broadening of the curriculum has grown out of these factors. The necessity of individual instruction has become insistent because of the

wide range of individual differences now in the schools. The narrow concept of formal discipline had to be broken in order to introduce more vital material to the great mass of these new students.

We would be justified in saying that much of the scientific advance in education during the past generation was forced because of these economic and social changes. On the other hand, many of the scientific investigations in education have made it possible for the effects of the social and economic changes to be dealt with much more intelligently and more rationally.

II. THE CHANGE IN THE CONCEPTION OF ECONOMIC FACTORS DURING THE PAST GENERATION

The very nature of the conception of the economic function of education has changed greatly during the past thirty or forty years. A generation ago education either was the right of a small and highly selected group or else it was a means that an individual used for his own economic advancement. Bringing the entire population within the orbit of the school has shifted the emphasis to group welfare.

III. ECONOMIC JUSTIFICATION FOR EDUCATION

During the course of the past few decades we have seen a great change take place in the economic justification advanced for education. From the time of Horace Mann one hundred years ago, the argument has been used that education increases economic welfare. The argument is very general. It was assumed that more intelligent people would create more wealth. The details of this process were taken largely on faith, however, and little was done to analyze the methods by which it could take place.

During the course of the past generation there have been a series of investigations that have forced a new conception as to how education increases economic welfare. In 1900 we were still in the 'faith' stage. We provided education because we believe it increased economic welfare as it performed many other desirable functions as well.

IV. THE EFFECT OF EDUCATION ON INDIVIDUAL INCOME

Through the first and second decades of the century there were something more than five hundred studies made comparing the earnings of individuals who went to school with those who did not go to school so long. It was rather uniformly discovered that elementary-

school graduates had larger incomes than those who were not elementary-school graduates, that high-school graduates had larger incomes than elementary-school graduates, and that college graduates had larger incomes than high-school graduates. It was very easy to assume that the education had caused this difference.

In the 1920's a long series of investigations carried on by the author of this article and by many others, showed very clearly that a more accurate technique than this would have to be developed. It would be necessary to equate the compared groups in all other factors than schooling. This, of course, proved exceedingly difficult and was never adequately done. But it was done sufficiently well to indicate fairly clearly that schooling somewhat beyond the end of the present secondary school seemed to increase individual earnings, even though groups were equated in regard to other factors.

A more important general conclusion, however, emerged and this was that the income of the individual was almost directly a function of the number of people that happened to be trained for a particular occupation. It was very clearly demonstrated by theoretical analysis and experimental investigations that you could easily train so many people for an occupation that the income of the individuals in the occupation was actually lowered.

V. THE EFFECT OF EDUCATION ON THE INCOME OF SOCIETY

Further analysis showed clearly that it was very important to take account of the effect of education upon the total income of the society, not merely upon the relative income of particular individuals. All the evidence available leads toward the conclusion that no modern industrial society has yet approximated the optimal amount of education that should be provided on purely economic grounds. There is still some dispute over certain parts of the evidence, but the weight of opinion is inclined towards the conclusion that an amount of education very considerably larger than that now provided in the United States would actually pay for itself. In other words, the income of the country would be less if any smaller amount of education were provided on the average. There would actually be less money to buy other things if the expenditure on education were reduced. There obviously is an optimal amount for any given society to spend on the education of its people. One of the important series of investigations that lie ahead is in determining this amount with more accuracy than it has been thus far determined.

VI. HOW MUCH EDUCATION SHOULD BE PROVIDED?

A generation ago this question was beginning to become insistent. It was asked: Should education be extended to the secondary school for most of the population? Now the same sort of question is being asked in regard to the junior college. Should the junior college become a part of the public-school system? The answer in general seems to be 'yes.' There are general educational and cultural reasons for thinking this is desirable. What we know about general and specific economic conditions would lead to much the same answer. The economic order has become sufficiently productive that the labor of these people could be spared. All the evidence we have seems to point toward the fact that the additional schooling will on the average increase the income of the individuals and, what is more important, will increase the total income of the society.

VII. THE ECONOMICS OF OCCUPATIONAL PLANNING

The great expansion of education has raised in crucial form the whole question of occupational guidance and planning. In the days when only a very small proportion of the population went to the secondary school or beyond, little guidance was necessary. Most of these persons would go into the professions or the higher ranks of our business or governmental services. With so large a part of our population now in the secondary school it has become necessary to provide fairly comprehensive guidance to boys and girls there and in college. If this is not done, we could easily train so many persons for particular occupations that it would be impossible for all of them to get jobs. One of the startling changes in education during the past generation has been the shift of occupational and vocational guidance from an individual to a social point of view. Twenty years ago many persons thought of education and vocational guidance as a means by which the individual could be trained and directed into a field where he could exploit society more efficiently. A long series of investigations have shown that this is an inadequate conception and that vocational guidance now must be primarily concerned with using all the people to do all the work of the world by making the best adjustment possible of work and people.¹

¹ For an extended discussion of this matter, the reader is referred to "Guidance in Educational Institutions," the yearbook of the Society issued contemporaneously with this one.—*Editor*.

VIII. TAXATION AND PROBLEMS OF SUPPORT

In simple agricultural societies wealth may be fairly evenly distributed. The type of economic development we had in this country during the latter half of the nineteenth century tended to bring about rather high concentration of income in a few great financial and industrial centers. Much of this wealth was produced out in the agricultural and mining communities all over the country. But many times ownership and control were highly concentrated. These changes went on at a rapid rate during the first third of the present century. They raised serious problems regarding school support and the type of taxation that would be necessary.

We have had an extended series of studies dealing with state aid and federal aid to schools. Much of this work would have been unnecessary if we had made careful studies of where the wealth was produced and devised a tax system to return it to those points. If in addition comprehensive plans had been developed to assist individuals into the more productive places, most of our problem would have been solved. These studies were not made. The result is that we now face rather desperate necessity of substantial subsidies on a state, and perhaps even on a national, basis. Studies now going on are trying to find methods of tapping these great concentrations of wealth and income.

IX. THE NATURE OF FREE EDUCATION

One of the most interesting changes that has developed during the past generation has been in the conception of free education. A generation ago when free education was mentioned, one thought of a school where no tuition was charged. In a society where only the wealthy or moderately well-to-do attend school, such a conception of a free school is reasonable. As long as the secondary schools and the colleges were attended largely by children from the middle and upper classes, a school was effectively free if no tuition were charged.

This situation changes drastically, however, when education begins to be made available to those in lower income groups. For instance, the 'free' State University of Indiana requires an expenditure of about \$700 a year for the average student. There can be no tuition charged in this university. For the well-to-do family in Indiana the \$700 yearly expenditure constitutes no effective barrier to the availability of education. In an average year, however, the average worker in Indiana prob-

ably does not make more than \$1400. To expect this average family to spend half of its entire income in sending one child to school is obviously not within the bounds of reason. And if there are two or three children, the situation rapidly approaches the absurd. The total result is that a new conception of free education is necessary.

When you keep in mind families in the lower income brackets and propose to make education available to the children of these families, you must provide more than just tuition if the education is to be effectively free. The studies that have been made during the past three decades have demonstrated this beyond a shadow of a doubt. One hundred years ago Horace Mann led the fight for what was then known as 'free education.' For the upper groups in our society that fight was won by the end of the nineteenth century. The real fight for 'free education' in the modern sense lies ahead. Education to be effectively free in the future must be provided on such terms that the lack of money on the part of an individual or on the part of his parents will not keep that individual from getting the education. As difficult as it may be to work out the practical details, this must provide the necessary elements of food, clothing, and shelter, if the lack of these is an effective barrier in keeping the person from getting the education.

X. COMPLEXITY OF CONSUMPTION

The past few decades have seen a great multiplication of the number of articles that are available for the consumption of the average man. This average man is no longer capable of judging of the quality of a large fraction of the products that are presented for his choice. Schools could formerly afford to ignore this problem because it was reasonable to assume that the individual in the school would become competent to judge the few articles that would be available for his consumption. We have had many studies that have shown how utterly impossible it is for the individual without adequate instruction to choose wisely even such simple things as diet or other items affecting his own health.

The increasing complexity of our economic order, then, has made it necessary to introduce many types of materials in the school dealing with the economics of consumption. Some of this material has been added in the elementary school. Much of it is now being added in the secondary school. More will doubtless ultimately find a place in the junior college. The preliminary investigations have indicated some of the general types of the material that are to be used, but really ade-

quate investigations in this field remain to be made in the decade or two to come.

XI. THE COMPLEXITY OF GENERAL ECONOMIC INFORMATION

The growing complexity of our economic life is not confined to the field of consumption. Direct instruction in the field of economics has had to be introduced on an ever-widening scale. That we have found many persons little capable of understanding this instruction is not surprising, considering the fact that we have not yet made systematic investigations of what the average man needs to know in order to understand the workings of the present economic world. A generation ago the few hundred or thousands of persons who studied economics were studying a highly abstract science. This science began with certain assumptions about the nature of man and the nature of the world about him. Then it proceeded to say, these things being true, other results will follow. The man who had not studied this abstract system carefully was much inclined to neglect the very careful assumptions that had been made and to assume that the conclusions held under all conditions.

It has become all too clear in recent years that it would be a waste of energy to introduce economics in the form of this abstract system to the mass of the population. What is urgently needed, as has just been said is to continue our investigations until we find what economic material is needed by the average man and then to make it available in our school systems.

XII. ECONOMIC CHANGES AND INCREASED LEISURE

A generation ago the steel mills of this country worked 12-hour shifts or longer. And those hours were not uncommon in many other fields. But the past few years have seen a marked reduction in the length of the working day and further reductions doubtless lie ahead. This change in working hours has definitely raised the problem regarding the relation of education to leisure time. Much effort should undoubtedly be spent in making labor more educative and more attractive. But when all this is done, there still probably will remain for many persons a question of the wiser use of their leisure time. A few preliminary investigations have indicated something of the extent and importance of this problem. The first tentative moves have been made in the matter of school curriculum. We can expect great changes to

occur both in research and in school practice when we systematically start to investigate the problems involved in the wiser use of our leisure time. It is not too much to expect a substantial fraction of the effort of the school in the generation that lies immediately ahead to be directed upon this problem.

XIII. TEACHERS AND ECONOMIC CHANGES

The general economic status of teachers has undoubtedly improved greatly during the past generation. This, of course, has been true for almost all sections of our society. Many investigations have been made during the past generation dealing with the problems of teachers' salaries, of security, tenure, retirement, and similar problems. These investigations do not indicate a decline in the status of the teacher in these regards; they show, rather, a desire to work out a really satisfactory solution. Though many more investigations are needed, the technical evidence now available would seem to indicate that it should be possible to get a satisfactory solution to all such problems. A rapid economic change has made necessary the retraining of teachers on a wide scale and we can look forward to a continuation of this trend in the years ahead.

XIV. ECONOMIC FACTORS CONDITION ALL EDUCATION

All education is conditioned and partially determined by the general economic conditions of the society. A very wealthy and productive society has at least the opportunity of providing widespread education. This, of course, does not mean that it will choose to use its economic energy in such a manner. In turn, education that is wisely planned can greatly increase the economic level of a society. A generation ago we had little more than general statements regarding the relation of economics to education. The investigations of the past generation have opened many promising fields. The generation that lies ahead should see the careful exploring of many of these fields and the beginning of the exploration of many others.

SECTION IV

SCIENCE AND PHILOSOPHY

CHAPTER XXXVIII

THE DETERMINATION OF ULTIMATE VALUES OR AIMS THROUGH ANTECEDENT OR A PRIORI SPECULA- TION OR THROUGH PRAGMATIC OR EMPIRICAL INQUIRY

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I. ALTERNATIVE CONCEPTIONS OF PHILOSOPHY

Philosophy is frequently presented as the systematic endeavor to obtain knowledge of what is called Ultimate and Eternal Reality. Many thinkers have defended this conception of its task and aim on the ground that human life can derive stable guidance only by means of ideals and standards that have their source in Ultimate Reality. On the other hand, scepticism about the worth of philosophy usually rests upon denial of the possibility of attaining such knowledge. When the business of philosophy is conceived in this manner, philosophical oppositions and controversies are believed to spring from conflicting conceptions of the nature of Ultimate and Perfect Reality. One school holds that it is spiritual; another that it is material. One school of thought holds that the particulars of the Universe are held together only externally by mechanical bonds; another school holds that they are organically united because of common subordination to a final controlling end and purpose that they all serve. Such divisions are inevitable as long as philosophy is defined as knowledge of supreme reality supposed to be beyond and beneath the things of experience.

But there is an alternative conception of philosophy, and the deepest philosophic divisions do not have their origin in a different conception of ultimate reality, but in the conflict between two opposed conceptions of what philosophy is about, its aim and task. According to this alternative view, the work of philosophy is confined to the things

of actual experience. Its business is criticism of experience as it exists at a given time and constructive projection of values, which, when acted upon, will render experience more unified, stable, and progressive. Defects and conflicts in experience as it exists demand thoroughgoing criticism of its contents and procedures. This phase of inquiry is not, however, final; criticism does not end with mere intellectual discrimination. It provides the basis for projection of values as yet unrealized, values that are to be translated into ends that move men to action. Philosophy thus conceived does not involve a flight and escape to that which is beyond experience. It is concerned with making the most possible out of experience, personal and social. Everyday homely objects and occupations of everyday life are possessed of potentialities that, under the guidance of deliberate and systematic intelligence, will make life fuller, richer, and more unified.

There are defects and conflicts in abundance in experience as it exists at any time. But they are to be dealt with in terms of experience, not by running away from it. They are a challenge to project, through systematic reflection, a better ordered and more inclusive experience. Systematic endeavor to meet this challenge constitutes the reality of genuine philosophy. The first-mentioned idea of the work of philosophy rests upon distrust of the capacity of experience to generate fundamental values and to direct deliberate effort in behalf of their realization. This distrust involves lack of loyalty to practical intelligence, substituting in its place dependence upon so-called *a priori* intuitions and upon an alleged faculty of pure Reason that grasps absolute non-empirical truth.

Hence, there is a further fundamental difference between the two ideas of the business of philosophy. According to the first-mentioned view, knowledge, provided that it is knowledge of ultimate reality, is the final goal, complete in independence of practical activity. According to the other view, thought and knowledge cannot themselves resolve the discords of existence and life. Even if there were a Reality beyond and behind the things of the experienced world and even if knowledge of it were possible, knowledge would leave the defects and inconsistencies of the world in which we live just what they were before. Only action can change things in the direction of unity and stability. To accomplish this result, action must be directed by leading principles, and such action, as the fruit of reflection upon actual experience, reveals new and as yet unrealized possibilities. The systematic critical work

that is philosophy has its constructive phase in projection of values and ends that, by their very constitution, demand application in action and guide the active operations they project.

There is a practical effect of absolute philosophies. But it is that of promoting conflicts and strengthening appeal to external authority as the sole agency for establishing order and unity in experience. Every absolute philosophy must claim to be in exclusive possession of *the* ultimate truth or else go back on its own pretensions. Absolute philosophies cannot tolerate rivals or learn from opposed philosophies. History shows that such philosophies have met with general acknowledgment only when they have had the support of powerful institutions, political and ecclesiastical. Their practical logic calls for external authority to enforce submission and punish heretical deviations. Absolute truth exacts absolute obedience. Recognition of the relation of philosophic ideas to the conditions set by experience furthers, on the contrary, intercommunication, exchange, and interaction. Through these processes differences of belief are modified in the direction of consensus. They are negotiable.

II. THE BEARING OF THE TWO CONCEPTIONS UPON THE RELATION OF PHILOSOPHY AND SCIENCE

The most important practical difference that follows from the two opposed conceptions of the aim of philosophy (especially with respect to the philosophy of education) concerns the relationship of philosophy and science. Since natural and humane sciences are based upon experience, and since, according to the first view of philosophy, the subject matter of experience is intrinsically inferior to that of Ultimate Reality, philosophy and science are, according to it, necessarily rivals unless science is willing to accept the dictates of metaphysics as a servant obeys his master. Adherents of this philosophy speak with lofty disdain of science as being 'merely empirical.'

From the standpoint of the other view, there is no competition between science and philosophy. They exist, so to speak, in distinct, although connected, dimensions. As far as knowledge is concerned, the primacy and ultimacy of science is admitted. For what 'science' means is simply the most authentic knowledge of nature, man, and society that is possible at any given time by means of the methods and techniques then and there available. The work of philosophy as critical and constructive does not attempt to furnish additional knowledge beyond

the reach of science. Its concern is rather with the values and ends that known facts and principles should subserve. This concern is manifested in ideas whose claim is to have authority over *action* in effecting realization of the ends and values in question, not to be authoritative in presenting any kind of superior 'reality' and knowledge.

This is the sense and the only sense in which philosophy can claim to be more comprehensive than science. This greater comprehensiveness exists because every intelligent systematic attempt to determine the values and uses to which ascertained knowledge should be put is philosophical as far as it goes, not because of any prerogatives inherent in a separate domain labelled 'philosophy.' Man is more than a knowing being. He is primarily a being who acts and makes and who must do and make in order to live. His activity is first of all an expression of emotion; of love and aversion, hope, and fear; of curiosities that lead him to explore and perils that make him draw back; a manifestation of impulse, desire, and habit. His behavior ranges from actions dictated by stupid callousness, by bare routine, and momentary caprice to an ordered behavior unified by planned purpose. The difference that exists between the former and the latter modes of conduct is due to an intelligence informed by known facts and principles. Purpose is vain and utopian unless based upon knowledge of existing conditions, which constitute both obstacles to overcome and means by which ends must be executed. Science is a name for the most exact and inclusive knowledge of these conditions that is attainable at a given time. But knowledge by itself, no matter how comprehensive and precise, does not tell what shall be done with what is known. 'Pure knowledge,' if called by its right name, would be termed 'knowledge isolated from connection with activity.' Upon the physiological side this isolation is equivalent to an impossible separation of the cortical cells of the brain from the muscles and the autonomic nervous system. Philosophy, once more, is a deliberate critical survey of the linkages that exist, in collective associated life and in individual life, between knowledge and values that determine man's fundamental purposes and desires.

It is often said that every person has *some* philosophy. This is true in the sense that everyone who does not float on the surface of the stream of life has some general scheme of values that joins what he believes with what he does. Artisan and architect, physician and engineer, artist and statesman, in as far as they live up to the demands and possibilities of their callings, exemplify a working connection of ideas and activities. Some degree and quality of philosophy is necessary to

give articulation and design to the multitude of details and circumstances that constitute living. Such philosophies, as a rule, are partial, because formed uncritically. 'Philosophy,' in the more technical sense of the word, grows out of these more limited philosophies by placing them in a wider content and a more extended horizon of values and ends. Even when perceived ends are fairly adequate in giving unity to the activities of a particular individual, they fail to meet the needs of ordered and progressive activity in behalf of relations.

The chief rival of philosophy, then, is not science but routine; beliefs that have grown up and taken on strong emotional and emotive force, no one knows how; the pressure of immediate circumstances; the influence of uncriticized example and precept; submissive accommodation to the demands of existing institutions and traditions. It is with respect to such forces that philosophy is systematic criticism. The criticism exercises a liberating power; it tends to free human activity from the grip of custom by opening up new possibilities. Through comparison of the very customs and habits that are in conflict with one another, intelligence is enabled to project new values, which, when acted upon, will create new customs.

III. THE PHILOSOPHY OF EDUCATION

1. Its Outstanding Importance

The philosophy of education is one phase of philosophy in general. It may be seriously questioned whether it is not the most important single phase of general philosophy. For education, when it is genuinely educational, brings about not only acquisition of knowledge and skills, but it forms also attitudes and dispositions that direct the uses to which acquired information and skill are put. While not as yet the most powerful existing agency in the formation of the disposition of individuals in its active relation to social needs and values, it is the one agency that deals deliberately and intentionally with the practical solution of the basic relations of the individual and the social. Moreover, it has to do with perpetuation of the positive values of inherited culture by embodying them in the dispositions of individuals who are to transmit culture into the future, and also with the creation of attitudes, understanding, and desire that will produce a better future culture. It performs its work in the medium of learning. Hence, the whole philosophic problem of the origin, nature, and function of knowledge is a live issue

in education, not just a problem for exercise of intellectual dialectical gymnastics. Indeed, it would be difficult to find a single important problem of general philosophic inquiry that does not come to a burning focus in matters of the determination of the proper subject matter of studies, the choice of methods of teaching, and the problem of the social organization and administration of the schools.

2. A Typical Problem: The Relation of Scientific Knowledge to Practical Activity

Consequently, the ground is too extensive to be adequately covered in this chapter. It is necessary to select a few typical aspects for discussion. The fact that the fundamental division between different philosophies is set by two opposed conceptions of the aim and business of philosophy suggests that the problem of knowledge, especially scientific knowledge, in its relation to practical activity be chosen for special consideration. The question of which type of philosophy shall control the philosophy of education is one of practical import. With respect to the organization and conduct of education, the issue is virtually whether traditions established in the past, in a pre-scientific age—traditions that have long endured, that have found expression in institutions that affect life most deeply, and that have gathered about themselves intense emotional attachments—or whether science and the scientific method in connection with experience shall exercise fundamental control.

As a force in the conduct of human affairs, scientific method is extremely new; as a force in education, it is even newer. In the latter, as in life generally, it is still a comparatively superficial coating over a thick layer of deposits from ancient customs, social institutions, and habitual outlooks. Science is endured and even highly approved as long as it is confined to providing more effective means for accomplishing results that are in harmony with the inherited scheme of cultural values. It is distrusted and feared when it threatens to influence and to alter the old system of ends, instead of limiting itself to supplying better means for realizing them. The application of science is welcomed, for example, in industrial life as far as new inventions and new technologies for production and distribution of commodities are concerned. But any endeavor to apply science to the reconstruction of human relations in the existing framework of economic and political institutions, any attempt to alter the values, positive and negative, that the existing system produces, is met with suspicion and active hostility.

It is even sometimes treated as an effort to undermine the very foundations of social order.

Something of the same sort exists in the field of education. The application of the results of scientific study to change the methods of teaching subjects that have the sanction of scholastic tradition encounters the resistance of inertia. But upon the whole they are gladly adopted as far as they give increased efficiency in the teaching of reading, writing, arithmetic, geography, etc. Attempt to use the newer knowledge of man and of social relations to give changed social direction to all the subjects of school teaching might be condemned as subversive of the established constitution of human relationships.

At this point what has been said about the general relation of science and philosophy applies to the special field of education. Science can examine the relation of cause and effect between established procedures in teaching and the results that follow in the learning by students of these particular subjects. Knowledge of this relation enables techniques to be developed that accomplish better results with less waste of energy, exactly as knowledge of cause and effect in physical and chemical fields is readily convertible into improved techniques for production of material commodities. But critical survey of the value of the consequences to which even the most improved techniques contribute would place the subjects in a wider context of their relationship to present social needs and issues. Improvement of old procedures is a gain. But it does not decide the nature of the ends to which education should contribute nor the right of the studies, even when taught more efficiently, to a place in the course of study. That question can be settled only by consideration of possibilities inherent in the science of social and cultural life—possibilities not adequately represented in the scheme of education that has come to us from traditions that have not been subjected to thoroughgoing criticism.

What has just been said does not imply, however, that there is a sharp separation, a hard-and-fast line of division, between science and philosophy in education. Existing conditions and their effects can be examined scientifically in a sense that unrealized possibilities cannot be. Yet there is a necessary connection between existing conditions and the values and ends that as yet are possible rather than actual. It is true, for example, that while science can determine the most effective ways of producing explosives, it cannot within this limited physical and chemical field determine the ends for which they shall be used; whether

for destruction of life and property in war, or for blasting away obstructions to easy communication and providing materials for the better housing of human beings. But an examination of the human consequences of warlike and peaceful pursuits is also possible, and this examination should be carried on in the objective spirit of science. The institution of war is capable of being subjected to critical survey, and critical survey will be intelligent only as it adopts the method of tracing relations of cause and effect that have proved to be effective in attaining knowledge in physical matters. When the effects taken into account are consequences upon human welfare, inquiry has passed into a field that, by comparison, is philosophical, since it has to do with values.

The narrower the field of inquiry, the more strictly scientific will it be, because conditions are then capable of more strict control. The wider the context, the more difficult becomes exact control of causal conditions. When the field is so broad as to include human weal and woe, and when it raises the problem of how existing social conditions can be modified to contribute more effectively to the values judged to be fundamental, inquiry is openly philosophy. But there is no fixed line at which it can be said that science ends and philosophy begins. The distinction between the two is relative to two things that vary with changes in historical and social condition. It is not absolute. One of the variables is the scope of the hypotheses that are involved in inquiry. It should not be necessary to insist upon the indispensability of ideas that function as hypotheses in scientific inquiry. But in the progress of science two kinds of hypotheses occur. While in any case a hypothesis goes beyond what has been definitely ascertained and is a venture into the unknown, in some instances a scientific hypothesis falls within the scope of a more comprehensive theory that has already been tested and experimentally confirmed. In some other instances, the hypothesis requires taking a new point of view, one so new that it contains what may justifiably be called a speculative element when it is judged from the standpoint of the established science of the time. Such hypotheses as the indestructibility of matter, the equivalent transformation of different forms of energy into one another, and the ideas of evolution and relativity, were philosophical at the outset. Only after long and arduous detailed observation and reflective elaboration did they take on strictly scientific character. The progress of science from one horizon to another depends upon willingness to entertain hypotheses that, when first advanced, outrun the possibility of scientific con-

firmation. The function of hypothesis is thus at once a link between science and philosophy and a basis of distinguishing between them on the ground of the breadth of the hypothesis as it first presented itself.

There is another variable involved, that of reference to unrealized possibilities. The possibilities represented by hypotheses in the physical field are possibilities with respect to the knowledge of the time in which they originate. When they are established by subsequent inquiry, we believe that they were there all the time as part of the order of nature. The case is not the same with those possibilities of human value with which philosophy is occupied. They have existed in some obscure and partial form or else our thought of them has no justifying basis. They must at least be suggested by what exists. But as directive principles of activity they present values that *should* be realized rather than things we discover to have existed all the time. What is implied in the constructive ideas of philosophy is that they have authority over activity to impel it to bring possible values into existence, not, as in the case of science, that they have authoritative claim to acknowledgment because they are already part of the order of nature.

It is not, then, an accidental matter that the present-day adherents of absolutistic, super-empirical philosophies base their criticisms of existing education and their proposals of reform upon appeal to Greek and Medieval tradition. For it was in ancient Greece that a philosophy of super-empirical Reality, and of truths about it that are identical under all conditions of experience, was formulated; and it was in the Middle Ages that, because of the sanction and support of a powerful social institution, philosophy actually flourished in the organized constitution of society. The conflict of the two philosophies of education is, therefore, a conflict between the intellectual and moral attitudes of a prescientific past and those consonant with the potentialities of the living present. Insistence upon the necessity of making a sharp separation between liberal and vocational education, upon the importance of literary classics in contrast with scientific subjects (with the exception of mathematics treated as an exemplar of a system of absolute truths instead of as an ordered system of deductions from freely chosen postulates), and lack of faith in anything approaching first-hand experience in the schools, all flow logically from the philosophy that rests upon return to the past. The function of a philosophy of education based upon experience is, on the contrary, constructive exploration of the possibilities of experience directed by scientific method.

For the only way out of existing educational confusion and conflict is just the critical and constructive exploration of the potentialities of existing experience as that experience is brought under the fuller control of intelligence represented by scientific method. The existing school system presents, like existing life and culture, an incoherent mixture of values and standards derived from the old and the new. The school has neither the benefit of values inherent in a culture that existed centuries ago nor yet of the values inherent in those possibilities of present experience that can be realized by a more thoroughgoing use of scientific method. On the one hand, schools are so peculiarly subject to the power of tradition and of uncriticized custom that they embody the subjects and ends of the past. On the other hand, pressure of demands arising from existing conditions, especially those arising from contemporary industrial and economic institutions, has compelled the introduction of new subjects and new courses of study. The educational response in the latter case has been, however, almost as uncritical as the response that is exhibited in the adoption of values and ends having the sanction of tradition. Science and the applications of science that ushered in first the machine age and now the age of power have forced by their sheer social pressure the introduction into the educational system of scientific subjects and of occupational training. But to a large extent these new subjects overlay the older ones as a recent geological stratum overlays, with 'faults' and distortions, older deposits.

3. The Place of Science and Scientific Method in the Schools

Consider first the place now given to science in the educational scheme. As far as form is concerned, the battle waged two and three generations ago to secure a place in the schools for the natural sciences has been won. Not so with respect to the substance of science. For the heart of science lies not in conclusions reached but in the method of observation, experimentation, and mathematical reasoning by which conclusions are established. Yet in large measure, it is the conclusions that are taught in schools, with a modicum of attention to the methods of controlled observation and testing, upon which the conclusions depend. So taught, 'science' (1) becomes a body of ready-made truth about facts and principles, and (2) is divorced from the everyday experiences out of which science grows and into which it returns. In other words, with respect to its educational status, science was to a large extent brought under the control of just those old standards and aims

that scientific method was, by right, undermining. It became an additional subject added to those previously existing, instead of being a method employed to reconstruct those subjects in the interest of a new, unified system of values. Moreover, when science is treated as a special and isolated body of facts and principles, it is adapted only to the capacity of comparatively mature intelligence, since it involves a special technical language and special skill in execution of technical procedures. The formation of the intellectual attitudes and habits of the young is thus left to the mercy of forces devoid of the controlling influence of scientific method.

In effect, the new scientific subjects were in considerable measure assimilated to the values, aims, and standards embodied in the subjects that expressed the intellectual habits of a prescientific age. Science as method, on the contrary, would permeate all school subjects. As method, it is the living spirit that actuates the formation and testing of beliefs in all subjects. As method, it is undeviating respect for the authority of evidence obtained from first-hand experience, is constant attention to the need of experimental activity to institute the observations that have the force of evidence, and is high valuation of ideas as means of interpreting and organizing the facts authenticated by controlled observation. Only as the living spirit of dealing with all subjects, engrained in all the procedures of learning, can science create the values inherent in it as method. There is a radical difference between a body of facts and principles, no matter how well established by the inquiries of others that are given and are accepted ready-made and the facts and principles that are developed through living experience under the direction of scientific method. The first constitutes a load of information. The second informs, in the sense of being the fundamental form of all intellectual response in all subjects.

4. The Relation of Knowledge to Experience

The issue of the relation of knowledge to experience is strikingly raised by the two opposed philosophies of education. According to one of them, knowledge is a final end in itself and nothing has a right to the name of 'knowledge' (in its full sense) unless it is attained by a faculty of reason and rational intuition supposed to be independent of experience. To treat knowledge as an end in itself is equivalent to isolating it from activity. Hence, the conviction of those who hold this philosophy that education is 'intellectual' only as knowledge is pursued

apart from connection with practical experience. The other philosophy demands with equal insistence that education be made to nurture and develop intelligence. But intelligence is not supposed to be that separate faculty to which classic traditional philosophy gave the name 'intellect'; it is trained power of judgment in choosing and forming means and ends in all the situations that life presents. The alternatives to formation of the fundamental attitudes and habits of life experience and of values and ends that give life whatever ordered articulation it possesses through the use of science are convention, prejudice, custom, and desire to believe that which it is agreeable to believe, either because of its harmony with personal wishes or its conformity with the expectations and requirements of the particular group of which one is a member.

The philosophy that holds knowledge to be inherently related to experience, when experience is informed by scientific method, requires that the schools provide a place for first-hand experience. It is not enough, as is sometimes assumed by so-called 'progressive' schools, that any kind of experience, as long as it is first-hand, will do. Nor is it enough to assume, as schools under the influence of routine tradition are given to assuming, that the function of experience is to produce forms of automatic skill. First-hand experience must be such as to evoke reflective observation and suggest ideas to be tested in appropriate forms of action. There must be continuity, not a stab at one thing one day and a jab at another thing the next day. Experience had outside school walls provides many opportunities for introduction within the school of activities under conditions that will utilize familiar everyday experiences for ends and values not subserved in the experiences had outside, values such as intellectual habits that are in harmony with the demands of scientific method and ability to understand social conditions and relations.

Science through its applications has already profoundly affected ordinary experience and the customary relations of human beings to one another. Modern industry in production and distribution of goods is the direct product of science. Machine and power technologies in creation of modern industrial methods have modified the family, the church, and state, as well as industry. The intimate connection between every present social and political issue with conditions that grow out of the consequences of industry and finance is sufficient evidence of the deep effect that applications of the new science have had upon

human relationships. It is commonplace to call attention to the social consequences of stationary and internal combustion engines, the steam locomotive, the dynamo, the telegraph and telephone, the automobile, radio, and airplane, and the revolution going on in many industries because of the application of chemical processes. These consequences permeate every nook and corner of life: nothing in the domain of human relations remains what it was. But the bearing of all these changes upon the work of the schools in promoting understanding of scientific method and of the forces, problems, and needs of social life has received comparatively little attention. Here lies the opportunity to which the philosophy of experience is peculiarly relevant.

There has been a tremendous increase of pre-industrial, industrial, vocational, and professional education. But upon the whole these subjects have been introduced to serve comparatively narrow practical ends. They have been treated as means of furnishing the information and skill demanded by industry and finance, as means of getting jobs and making money under existing social conditions. Their wider practical value as means of understanding the nature of scientific method and the social consequences of applied science, as means of insight into agencies by which a more humane and just social order may be created, has been, comparatively speaking, slighted.

Those who still adhere to the philosophy of Aristotle and St. Thomas are logical in their demand that there be even a greater separation between occupational and 'liberal and cultural' education than now exists. This demand is predicated upon the common practice of treating occupational education as rule-of-thumb procedures and a body of information about occupations, involving in both cases no reflective thinking. Hence the only way in which their criticisms and proposals can be fundamentally met is to avoid this common practice and to use the rich store of scientific and social values contained in the so-called 'practical' studies and activities. It is not the actual structure and processes of experience, even in its practical factors, that produce the consequences that are objected to but certain preconceptions about it and about education. The *a priori* philosophy confirms these preconceptions, since it holds that experience is incapable of generating significant ideas, while the older empiristic philosophy, by reducing ideas to copies of prior experiences, tended in the same direction.

In the third count, the older empirical philosophy was intensely individualistic. It had no room for any processes save those going on be-

tween what was supposed to be a strictly individual consciousness and the physical environment. It did not recognize how intimately relations with other human beings enter into the very constitution of experience. Its tendency, accordingly, was to pulverize society into a number of atomic constituents having only external relations with one another. It lacked power to explain existing social institutions and still more to provide ideas by which social relations could be bettered. It served a useful purpose as far as institutions repressed and suppressed individuals; it proclaimed the inherent right of individuals to a freedom denied them. But it was impotent with respect to indication of new social syntheses to replace those it criticized. In educational application it strengthened introduction of forms of information and skill that would further individualistic success, but, so far as its influence went, it was weak in cultivating attitudes of coöperative and unified effort. Its gaps and defects called out a reaction in favor of absolutistic philosophy as the only ground upon which the interests of social unity could be maintained.

The fact that adherents of a *a priori*, non-empirical, and anti-scientific philosophy still base their criticisms of the philosophy of experience in itself and in its educational import upon conceptions of experience formulated in the earlier empirical philosophy gives additional point to the importance of a philosophy that recognizes the inherent place and function in experience of practical constructive intelligence, the union of knowledge with action, and the permeation of experience with social values. It makes clear the fact that the sole effective way of combating reactionary tendencies, with their appeal to external authority, is deliberate development of a philosophy of experience based upon recognition of the liberating and directive force of intelligence. It takes full advantage of the intimate connection of science with changes in social institutions and in human relationships. It is superstition to suppose that experience is not capable of developing values of the most precious sort. It is disloyalty to intelligence to suppose that it is not capable of apprehending these values and giving them the form in which they are capable of directing organized and ordered collective endeavor. It is a defeatist libel upon human nature to suppose that it is incapable of responding actively to the claims of these values and the power of intelligence to work for their realization.

The trouble with education does not proceed from introduction of scientific subjects and vocational activities. It proceeds from the in-

consistent mixture of the values inherent in these subjects with those derived from traditions and customs that originated in the prescientific and predemocratic age but that still endure in the educational system. Systematic development of the values potentially present in personal and social experience, as that moves under control by scientifically informed intelligence, provides the road out. The immediate task of a philosophy of education is to clarify the meaning of such a movement in terms of subject matter and methods of school activities and studies from the very beginning through the university. This task is negative as far as criticism is concerned with the materials, methods, and aims that hold over from the traditions and customs of a prescientific age. It is positive in that it discloses values inherent in experience as that is transformed through the efforts of those who are actuated by practical and collective intelligence. The promises of education and of social life are identical in this respect. A philosophy of education faithful to the possibilities of experience and scientific method will not of itself accomplish the needed change. But it will contribute by making clear the road to be followed and the goal to which it leads.

CHAPTER XXXIX

CONCLUDING COMMENTS AND REMARKS ON THE PROVINCE OF SCIENTIFIC INQUIRY

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In the foregoing pages specialists in the various fields have described the concrete results of the scientific study of the educational problems in these fields. They have shown how administrators have gained a perspective from which to evaluate the procedures and performances in their own school systems or institutions through exact and objective comparisons with other systems and institutions. They have shown how a knowledge of the social trends enables those in charge of programs of building construction, and also of programs of instruction carried on within the buildings, to make the school an integral part of the social organism, effectively performing its function. They have dealt with the more detailed procedures in the classroom and have indicated how the study of the laws of learning, of individual differences, and of mental growth has lifted these procedures out of the realm of rule of thumb into that of intelligence. They have dwelt on the techniques by which the exact study of education and its relation to society may be made and have reviewed the general disciplines that contribute information basic to the grasp of the fundamental conditions of education.

I. THE ULTIMATE SIGNIFICANCE OF THE SCIENTIFIC MOVEMENT IN EDUCATION

This review of the achievements of the scientific movement in education during the past generation makes an impressive showing. The ultimate significance of this movement, however, is not determined

beyond question by such a review. It is possible, after examining these achievements, to view them as essentially superficial in character, as concerned with the husk rather than the kernel of the educational process. Science can, in this view, evaluate the means, but not the ends; it can estimate the efficiency of the process, but cannot determine or even influence its direction. It has, therefore, gone about as far as it can in improving education. For further advance, it may be asserted, we must turn to an essentially different inquiry, the discovery or rediscovery of the basic values that underlie education. This is to be made by independent and self-sustaining thought or reflection. Science has shot its bolt. It remains for philosophy to take the field.

II. THE FIELDS OF SCIENCE AND PHILOSOPHY AND THEIR INTERRELATIONS

This contrast between science and philosophy is common—perhaps it is common sense. Possibly, however, it is not the final word. May science not contribute in genuine fashion to philosophy and may not philosophy, after all, be assimilated to science? Does not the temper of mind generated by science demand a new philosophical method and point of view, one in which the line between the two disciplines becomes obliterated? If this is the case the scientific movement of the past generation may be but the first chapter in a never-ending quest for the clearer understanding of the functions and procedures of the great process by which society renews itself and by which, in part, it advances itself from generation to generation.

It is appropriate that this broader question be dealt with in the Yearbook, and it is fitting that it should be treated by the man who has been the chief figure in creating the philosophy of science. Professor Dewey's words speak for themselves. They will be instantly recognized as a timely and incisive statement on a fundamental issue.

If scientific inquiry is not to be regarded as strictly limited to a lower realm of problem, but rather may be permitted, in principle, to explore any problem for the study of which it may develop a suitable technique, it may not be out of place to add a few cogitations regarding future possibilities as a supplement to our review of past achievements.

1. The View Reserving the Determination of Ends to Philosophy

A widely accepted view holds that scientific inquiry is confined to the physical world and to those aspects of mental or spiritual life that

constitute means rather than ends. Such a view banishes speculation from the physical realm or reduces it to a sort of play, but retains it as an essential method in the realm of human thought and action. It recognizes the superiority of science even in some parts of the realm of mental life; that is, in the determination of the conditions of efficiency of action, as in the study of methods of learning. But it reserves for philosophy the realm of the determination of the ends and values of human conduct. This is reserved because it is based, not on what is, not on past or present experience, but on a projection into future experience. It receives its ultimate validation, to be sure, in subsequent experience. It is not self-validating, or validated in terms of inner consistency or pure thought as is the case in absolutist philosophy; but because its validation is a matter of future, rather than present or past, experience the technique of the discovery and validation of ends and values is qualitatively different from that of science.

2. Hypotheses in Science and in Philosophy

In spite of this distinction drawn between science and philosophy, an analogy, at least, is recognized between them. This projection of values or ends that are validated by future experience is seen as similar to the setting up of hypotheses in scientific inquiry. This, of course, is an essential and regular feature of the procedure of science. But two distinctions are set up, by implication or direct statement, between the use of hypotheses in science and that in philosophy. First, the hypotheses of philosophy are said to be broader and more inclusive than those of science. They cover wider areas of life and deal with the interrelations of different areas of life instead of with one narrow section. The hypotheses of science, on the contrary, deal only with the phenomena that fall within the scope of a specific scientific field of inquiry. Second, the hypotheses of philosophy deal with ends and values, with the basis of human action, whereas the hypotheses of science are confined to the means and the instruments to the attainment of these ends.

The first difference is obviously a matter of degree. It is permissible, of course, to give one name to the procedure of setting up hypotheses within a narrow field and another name to the procedure when the field is broad, but it seems of doubtful expediency to do so. The mental process seems essentially alike. It is true that in the one case one may have to cover a greater range of facts and to allow greater play to the imagination than in the other, but it is also true that there is a great

range in these matters within the field that all would grant to be scientific. Consider, for example, the contrast in the range of the evolutionary hypothesis as conceived by Darwin and the hypothesis that the mosquito is a carrier of yellow fever. Yet both were scientific hypotheses.

3. The Determination of Values and Principles of Action

The case of values and of principles of action is not so clear. The issue has to be approached less simply and directly. Let it be admitted at the outset that most, if not all, of the science that has been developed up to the present is incompetent to settle, or even to serve as a direct and sufficient guide to, conduct. Many, perhaps the vast majority, of the choices that concern the life of the individual or of the group are based in part on presuppositions or on emotional leanings that have nothing to do with science. They frequently, as Professor Dewey says, are based on custom, tradition, routine. In so far as this is so, they are neither scientific nor philosophic. A philosophy that is just uncritical and unreflective reaction is, of course, not true philosophy any more than it is science. To call it such is to misuse the term.

Philosophy, then, is the critical evaluation of action and of prospective action in terms of values, so that conduct shall be guided by intelligence and not by blind impulse. What, then, are these values? What is their nature? How are they apprehended and validated? There seem to be only two sources of value, the transcendental and the absolute on the one hand and experience on the other. One may seek to validate the values to which he commits himself by reference to the *a priori* principles of absolute philosophy or he may seek their basis in experience. There seems no other choice.

If now we seek to validate values in experience, how do we go about it? It would seem that the first thing to do would be to examine experience. Furthermore, if values are to have validity for groups of people, and not be purely private and individual, the examination should include many people, and people in their relation to each other and not in isolation. The purpose of this examination would be to find out how various kinds of behavior worked out. By comparing the effects of different forms of behavior, generalizations might be arrived at, making due allowance for variations in the conditions. The investigator might go a step farther and by a creative act of imagination, on the basis of his observations, project a form of behavior different in some respects

from any in existence that might work better than any previous behavior.

What are the criteria by which behavior may be said to work or not to work, or to be satisfactory or the opposite? The criteria must be found in experience and not be imported from the outside. It would appear that there may be two classes of criteria, the objective and the subjective. They may supplement each other and the combination is probably better than either alone.

It would be too ambitious to attempt anything like an exhaustive list of either the objective or the subjective criteria, but a few suggestions may be made. On the objective side, health would seem to be one reasonable criterion, to be used, of course, in conjunction with others and not as a sole standard. In the physical sphere it would doubtless be agreed that behavior that leads to health, other things being equal, is to be preferred to behavior that impairs health or leads to disease. We cannot now define or measure mental health as clearly as physical health, but we have a sufficiently clear concept of it to use this also as a criterion. Surely a modification in behavior that would reduce the number of patients in mental hospitals would in so far forth be desirable.

Another objective criterion that might, perhaps, be applied is the vigorous and smooth functioning of the organism. This is related to health, but it goes beyond it. It means productivity as well as a condition of the organism itself. It concerns external, as well as internal, adjustments. The person who gets things done, who stimulates others to get things done, who coöperates effectively in production is better than the one who does not. Conduct that brings this about is, by so much, desirable conduct.

The condition of a society may be appraised objectively as well as that of an individual, and the actions that bring about the condition may thus be evaluated. For example, peace is a desirable and war an undesirable condition. Similarly with wealth and poverty. A growing or developing society may, perhaps, be set higher than a stationary or declining one.

Some objective characteristics of individuals or of societies, then, may be accepted by common consent as marks of health or as desirable on other grounds. These could be made the basis of assumptions on the ground of which conduct could be evaluated.

Are objective characteristics ultimate or do they get their meaning

because they lead to subjective experiences? Probably a good case could be made out for the view that the subjective is the ultimate criterion of value. The objective condition is approved or condemned because it is found to be regularly associated with pleasant or unpleasant, satisfying or unsatisfying experiences. An examination of the objective consequences might in such case be a convenient and economical means of evaluating conduct, but it would not be the final means.

Various subjective experiences may be considered good in themselves and worthy to be sought after. This is not the place to attempt to make a catalog of them. Perhaps the most inclusive, and the one that would be most generally agreed to, is happiness. It may be a matter of dispute whether happiness is best attained by directly seeking it, but that it is a good, once it is secured, few would deny. The desire to secure greater happiness for a greater proportion of mankind is doubtless the motive of most honest schemes for human betterment.

A few ends or values have been chosen for illustration about which it is believed there will be comparatively little dispute. Others might be mentioned that would arouse a good deal of controversy. These form the subject matter of philosophy; that is, of that branch of philosophy that deals with conduct. How now does the type of philosophy that regards experience as the ultimate criterion of values proceed? (Excluded, of course, is the philosophy that finds the source of value in an abstract and *a priori* concept of the good.) It attempts to disentangle the complex web of experience and to trace back its threads to some simple and ultimate form of experience to which any person who recognizes it may give immediate assent or dissent. Its business is to think through causes and consequences and to simplify the complexity of experience. This may be called the reduction to general principles. What it really appears to be is a reduction to simple elementary experiences to which the individual may react as good or bad in terms of immediate feeling.

The problem of determining values in terms of experience seems to be a double one. It involves, first, disentangling complex situations and forms of behavior in order to reduce them to the simpler terms of their constituent elements or factors. One set of factors may consist of motives, impulses, or aims, another of consequences. Each of these is ordinarily very complex and capable of extensive analysis. The determination of values involves, in the second place, the judgment of the significance of the various elements or factors, once they have been dis-

entangled. If, as may be the case, the whole has independent value different from the sum of its parts, the analysis will be unnecessary and may even be misleading.

If analysis is to be made, it would appear that the scientific method, as represented in psychology, is the best means of making it. The analysis of motives or drives, for example, is clearly a subject for psychological inquiry. The same is true of the consequences of behavior. The determination of what consequences follow from given behavior is a matter of fact to be made by as objective methods as possible.

When we have made all pertinent forms of analysis and have traced consequences, how shall we finally determine what motive or what consequence is good or bad? How but in terms of the testimony of persons who experience the motives and consequences? What other test is there in the last analysis? It is the same in conduct as in esthetics. All the principles laid down by the critics or the philosophers must finally come down to the declaration of some person in the face of some experience that this is good, or this is bad. This is in fact the basis and is in theory the only possible basis.

There is a fundamental difficulty in the determination of values which is inescapable because it is inherent in the situation. The difficulty is due, first, to the fact that judgments of good are relative—one experience is good in comparison to another, and experiences should more properly be spoken of as better or worse instead of good or bad. It is due, second, to the fact that one experience frequently excludes another, so that the individual is unable to make the comparison. Not only are diverse experiences often mutually exclusive at a given moment of time, but they are frequently so within the life of any individual. Thus, one cannot at the same time be an old man who has been a libertine and one who has been chaste in his youth.

As a consequence we are thrown back on the comparison between the experiences of different persons and upon a social evaluation of experience as an essential part of the process of evaluation. In other words, evaluation must be a matter, in part, of vicarious experience. This vicarious experience extends both to the experience of contemporaries and to that of men in successive periods of history.

All this appears to be susceptible to investigation by the methods of science, broadly conceived. This is not to say that science has covered the field, only that it could do so and that it would do so most satisfactorily. Until it has done so, we must do the best we can with gen-

eralizations based on more restricted and less well-controlled observation than can be made by science. We shall always, probably, have use for the broad synthesizing review of investigation in special fields, such as is represented by the work of Einstein in physics. This would seem to be the residue of the function of the philosopher when science has extended its domain to its natural limits.

There remains a comment on the bearing of values on the life of the individual. It is not implied in anything that has been said that science can lay out a blueprint for the life of any individual. It can go far toward the establishment of general values, but these can serve only as general guides and not as dictated rules for the individual. The conduct of the individual includes creative acts by which he affirms by action what are values to him. These may be, in part, acts of faith to be validated by later experience. They are creative also in the sense that they produce the values that the individual enjoys. Such creative acts constitute part of the phenomena that either science or philosophy will take into account in their generalizations, but they do not constitute either science or philosophy. These consist of bodies of generalizations, whereas creative acts are the substance of individual living.

If these remarks are sound, it would seem that the realm of science has no bounds except the bounds of human experience. Some fields of experience may be cultivated narrowly and by intensive, analytical methods; others require a broad synthetic sweep of thought. There may well be division of labor between the analyzers and the synthesizers. But both deal with the same stuff. Both need to have the feel of immediate experience, to start from it and return to it. It is the only source of validation.

In any complex enterprise like education, the procedures are determined in a variety of ways. In spite of all our discussion, tradition is still probably the major factor. However, tradition is called in question from time to time and at various points on the ground of opinions derived from the observation of human life, a knowledge of human history, and the personal reaction of the holder of the opinion to real or imagined experience. A person who develops a body of opinions in such a manner and arranges them in more or less systematic order may be said to have a 'philosophy' of education. He frequently attracts a group of adherents who constitute a 'school.' The doctrines of the school may become relatively fixed, and so we have a return to tradition.

This procedure will doubtless always be followed to a greater or less

extent. There will always be a battle between tradition and intelligent criticism and evaluation. By criticism opinions may be kept from freezing too soon or staying too solidly frozen. But science offers an additional remedy. It promises to provide the ground for more intelligent criticism by setting up modes of investigation that give a broader base than is furnished by mere opinion. The ultimate basis is experience; the question is, whose experience and how formulated?

We cannot look forward to an immediate or a complete conquest of this, or any other, realm of human institutional behavior by scientific inquiry. We may hope to see the accumulation of fuller knowledge concerning the nature and bases of human behavior, including the values that men live by, and the progressive examination and evaluation of education in the light of this knowledge. We need not quibble over words. The synthesizing and evaluating may be called 'philosophy' if any good purpose is served by preserving the name. The crucial question is: What is synthesized and what is the basis of the evaluation? If it is experience, formulated as precisely and objectively as possible, that is synthesized, and if this synthesized experience is the basis of evaluation, we may expect education and any human endeavor so examined to become more intelligent and more serviceable to human needs.

CONSTITUTION OF THE NATIONAL SOCIETY FOR THE STUDY OF EDUCATION

(As Revised at the 1924 Meeting and Amended in 1926, 1928, 1929, 1932, and 1933)

Article I

Name. The name of this Society shall be "The National Society for the Study of Education."

Article II

Object. Its purposes are to carry on the investigation of educational problems, to publish the results, and to promote their discussion.

Article III

Membership. Section 1. There shall be two classes of members—active and honorary.

Section 2. Any person who is desirous of promoting the purposes of this Society is eligible to active membership and shall become such on payment of dues as prescribed.

Section 3. Active members shall be entitled to vote, to participate in discussion, and under certain conditions, to hold office.

Section 4. Honorary members shall be entitled to all the privileges of active members, with the exception of voting and holding office, and shall be exempt from the payment of dues.

A person may be elected to honorary membership by vote of the Society on nomination by the Board of Directors.

Section 5. The names of the active and honorary members shall be printed in the Yearbook.

Section 6. The annual dues for active members shall be \$2.50. The election fee for active members shall be \$1.00.

Article IV

Officers. Section 1. The Officers of the Society shall be a Board of Directors, a Council, and a Secretary-Treasurer.

Section 2. The Board of Directors shall consist of six members of the Society and the Secretary-Treasurer. Only active members who have contributed to the Yearbooks shall be eligible to serve as directors, and no member who, under the provisions of Section 3, has been elected for two full terms in immediate succession shall be eligible to reelection to succeed himself for a third term.

Section 3. The Board of Directors shall be elected by the Society to serve for three years, beginning on March first after their election. Two members

of the Board shall be elected annually (and such additional members as may be necessary to fill vacancies that may have arisen).

This election shall be conducted by an annual mail ballot of all active members of the Society. A primary ballot shall be secured in October, in which the active members shall nominate from a list of members eligible to said Board. The names of the six persons receiving the highest number of votes on this primary ballot shall be submitted in November for a second ballot for the election of the two members of the Board. The two persons (or more in the case of special vacancies) then receiving the highest number of votes shall be declared elected.

Section 4. The Board of Directors shall have general charge of the work of the Society, shall appoint its own Chairman, shall appoint the Secretary-Treasurer, and the members of the Council. It shall have power to fill vacancies within its membership, until a successor shall be elected as prescribed in Section 3.

Section 5. The Council shall consist of the Board of Directors, the chairmen of the Society's Yearbook and Research Committees, and such other active members of the Society as the Board of Directors may appoint from time to time.

Section 6. The function of the Council shall be to further the objects of the Society by assisting the Board of Directors in planning and carrying forward the educational undertakings of the Society.

Article V

Publications. The Society shall publish *The Yearbook of the National Society for the Study of Education* and such supplements as the Board of Directors may provide for.

Article VI

Meetings. The Society shall hold its annual meetings at the time and place of the annual Meetings of the American Association of School Administrators of the National Education Association. Other meetings may be held when authorized by the Society or by the Board of Directors.

Article VII

Amendments. Proposals to amend this Constitution may be made by the Board of Directors or by petition of twenty-five or more active members of the Society. Such proposals shall be submitted to all active members for a mail vote, and shall be declared adopted if approved by two-thirds of the members voting thereon.

MINUTES OF THE NEW ORLEANS MEETING OF THE SOCIETY FEBRUARY 20, 1937

The two sessions were held in the Concert Hall of the Municipal Auditorium, a room that proved to be much too large for the disappointing attendance that greeted our attempt to hold our 'second' session Saturday afternoon instead of Tuesday evening as has been our custom for years.

FIRST SESSION —SATURDAY AFTERNOON, FEBRUARY 20

It is difficult to tell which of the several possible explanations (relatively small attendance at the convention as a whole, distance of the auditorium from the hotels, difficulty in locating the hall within the building, relatively poor illumination and general inattractiveness of the hall, undesirability of Saturday afternoon on the crowded program) accounted for the small attendance—some three hundred fifty—at this first session. Our Society had invited the American Educational Research Association and the Society for Curriculum Study to join us on this occasion because both the topic under discussion—"The Teaching of Reading"—and the contributors to our Yearbook on this topic seemed to indicate community of interest and personnel. Unfortunately, it turned out to be impossible to avoid concurrent sessions of these cooperating organizations.

To add to the disappointments, Dean Haggerty was unable to reach the hall in time to preside and the officers of the cooperating societies could not be located, so that, after some delay, the session was called to order by the Secretary, who presided while the following program, in which outstanding speakers discussed a yearbook of great educational importance, the *Thirty-Sixth Yearbook*, Part I, entitled "The Teaching of Reading: A Second Report," was presented:

Representing the Yearbook Committee

I. "Introducing the Yearbook."

William S. Gray, Professor of Education, University of Chicago, Chicago, Illinois, and Chairman of the Society's Committee. (12 minutes)

II. "The Place of Reading in the School Curriculum."

Bess Goodykoontz, Assistant Commissioner of Education, Office of Education, Washington, D. C. (12 minutes)

III. "Guidance in Reading in the Various Curricular Fields."

Ernest Horn, Professor of Education, State University of Iowa, Iowa City, Iowa. (12 minutes)

IV. "Reading and the Individual (Testing, Diagnosis, and Provision for Individual Needs)."

Arthur I. Gates, Professor of Education, Teachers College, Columbia University, New York, New York. (12 minutes)

Representing the Associations Participating in the Joint Meeting

I. "The Psychological and Scientific Validity of the Contents of the Yearbook."

Paul A. Witty, Professor of Education and Director, Psycho-Educational Clinic, Northwestern University, Evanston, Illinois.
(12 minutes)

II. "The Extent to Which the Recommended Reading Program Harmonizes with Current Curricular Trends."

Paul B. Diederich, Professor of Education, Ohio State University, Columbus, Ohio. (12 minutes)

III. "The Practical Contributions of the Yearbook to School Officers and Teachers."

C. L. Cushman, Director of Research and Curriculum, Public Schools, Denver, Colorado. (12 minutes)

IV. Informal Discussion.

Open to members of the three associations. (4 minutes each)

In the informal discussion, Professor S. A. Courtis spoke on the meaning of reading scores and Professor Gray on the interests of children, while brief comments were made by Professor Townsend, Miss Force, Professor Diederich, and one or two others whose names could not be ascertained.

SECOND SESSION — SATURDAY EVENING, FEBRUARY 20

At this session there was an even smaller attendance to hear the presentation and discussion of Part II of the Society's *Thirty-Sixth Yearbook*, entitled "International Understanding through the Public-School Curriculum," although the four scheduled addresses were scholarly, interesting, and much worth hearing.

Dean M. E. Haggerty, Chairman of the Board of Directors, presided, and the program was as follows:

I. "Introducing the Yearbook."

I. L. Kandel, Professor of Education, Teachers College, Columbia University, New York, New York, and Chairman of the Society's Committee. (15 minutes)

II. "Accepted General Principles."

Paul Monroe, Director of the International Institute and Professor Emeritus of Education, Teachers College, Columbia University, New York, New York. (30 minutes)

III. "Problems of Pacific Relations."

Reginald Bell, Associate Professor of Education, Stanford University, Palo Alto, California. (15 minutes)

IV. "A Critical Appraisal of the Yearbook."

Willis L. Uhl, Dean, College of Education, University of Washington, Seattle, Washington. (15 minutes)

V. Informal Discussion.

Open to members of the Society. (4 minutes each)

GUY M. WHIPPLE, *Secretary*.

SYNOPSIS OF THE PROCEEDINGS OF THE BOARD OF DIRECTORS OF THE SOCIETY DURING 1937

This synopsis, indicating matters of importance only that have been considered by the Board of Directors, is presented in order that the members of the Society may be informed concerning the acts and policies of those who are directing the work of the Society.

I

NEW ORLEANS MEETING OF THE BOARD

New Orleans, Louisiana: Hotel Saint Charles, February 21, 1937.

Present: Freeman, Haggerty, Horn, Trabue, Uhl, Whipple; also by invitation, Director-elect R. W. Tyler, and for short periods, Superintendent Washburne, Dean Kefauver, and Professor Stoddard.

Absent: Counts.

1. The Secretary reported, as the result of the ballot in December, 1936, the reelection of Professor Ernest Horn and the election of Professor Ralph W. Tyler, to serve for three years, beginning March 1, 1937.

2. The Treasurer presented figures to show the financial status of each yearbook committee and a comparative statement of the receipts and expenditures during the last four years.

3. The Board approved the recommendation of the Treasurer to begin the fiscal year, in 1937 and thereafter, on July 1 instead of March 1.

4. The Secretary reported that Manfred J. Holmes had been unanimously nominated for honorary membership in the Society as a result of correspondence prior to this meeting. [He was formally elected at a business meeting of the Society held February 20, 1937.]

5. Director Frank N. Freeman was elected to serve as Chairman of the Board for one year, beginning March 1, 1937.

6. Directors Freeman and Tyler were appointed representatives of the Society on the Council of the A.A.A.S. in connection with the December meeting of that organization at Indianapolis.

7. Director Haggerty reported the status of the proposal looking toward a Yearbook on Art Education, including steps he had taken to interest the Carnegie Foundation for the Advancement of Teaching in subsidizing the preparation of this yearbook.

8. The Board acted favorably on a report by Dean Grayson N. Kefauver that the Society should appoint a committee to prepare a Yearbook on Guidance and authorized a committee of seven, to consist of Richard Allen, Margaret Bennett, A. H. Edgerton, Arthur Jones, Franklin Keller, and Ruth Strang, to serve under Dean Kefauver as chairman. The Board appropriated \$1000

in addition to the unexpended balance of the previous appropriation for the completion of this yearbook.

9. After conference with Superintendent Washburne, the Board authorized a committee, consisting of John Anderson, Fowler Brooks, Kai Jensen, Arthur Jersild, Harold Jones, Paul McKee, and Ralph Tyler, to serve under the chairmanship of Superintendent Washburne in producing a yearbook dealing with the general problem of maturity in its relation to the public-school curriculum. [Subsequently L. J. Brueckner was appointed in place of Paul McKee, who felt unable to serve.] The Board appropriated \$1100, including the amount remaining from a previous appropriation of \$250, for the work of this committee.

10. The Board discussed in detail a statement proffered by Professors Howard Wilson and Edgar Wesley looking toward the solicitation from other agencies of a subvention for the preparation of a Yearbook on the Social Studies that had been proposed by these gentlemen. The Secretary was asked to inquire of these gentlemen whether they would look favorably upon a more modest program contemplating the publication in the immediate future of a yearbook that would summarize the work done in the field of the social studies and sketch the proposed project in moderate detail.

11. There was extended discussion of the details of the Yearbook on "The Scientific Movement in Education," in anticipation of the publication of this yearbook in February, 1938.

12. Professor George D. Stoddard, of the State University of Iowa, presented a typed outline of a proposed yearbook to deal with "Intelligence"—envisaged as a collection, interpretation, and summary of the existing materials and points of view. The Board judged that such a yearbook could be completed for publication in 1940 and appropriated \$600 for use during the next twelve months by a committee operating under the chairmanship of Professor Stoddard.

13. The proposal submitted by William B. Brown that the Society undertake a Yearbook on Safety Education was discussed, with the conclusion that the Board ought not to undertake such a yearbook in view of the many other organizations already at work in this field.

14. On account of his inability to attend meetings of the Board or participate actively in the work of the Society, Professor George S. Counts resigned as Director. The Board accepted the resignation and appointed in his place, to hold office until March 1, 1938, Professor Leo J. Brueckner, of the University of Minnesota.

II

CHICAGO MEETING OF THE BOARD

Chicago, Illinois: Hotel Stevens, August 21, 1937.

Present: Freeman, Horn, Trabue, Tyler, Whipple. By invitation, for a short time, Dean Grayson N. Kefauver.

Absent: Brueckner, Uhl.

1. It was agreed to hold the first Atlantic City meeting of the Society on Saturday afternoon, February 26, 1938, and invite organizations interested in educational guidance to be the guests of the Society at that time. The usual Saturday evening meeting was scheduled for the discussion of the Yearbook on the Scientific Movement in Education.

2. A communication from Professor George Stoddard, of the University of Iowa, in connection with the yearbook on "Intelligence: Its Nature and Nurture," led to the endorsement by the Board of a committee on this yearbook to be composed of Professor Stoddard as Chairman, Frank N. Freeman (Chicago), Florence Goodenough (Minnesota), Harold Jones (California), Lewis M. Terman (Stanford), Beth Wellman (Iowa), and Sewall Wright (Chicago), with the suggestion that some Eastern representatives be added. [Subsequently there were invited to membership on this committee Professors Carmichael (Rochester) and Leta Stetter Hollingworth (Columbia).]

3. The question raised by Superintendent Washburne, Chairman of the Society's Committee on Maturity, as to the desirable length of this yearbook was discussed, with the decision to defer final action until the plans of the Committee were somewhat further developed.

4. A letter from Dean Haggerty, summarizing the steps taken to August, 1937, with respect to the Yearbook on Art Education, was read. The most important feature of the situation discussed pertained to the relation between the responsibility and financial participation of the Society and of the Carnegie Foundation, respectively. The position stressed by the Board was that there should be no expenditure of the funds granted by the Carnegie Foundation that was disapproved of by the Board. In effect this means that the Society will have placed at the disposal of the Yearbook Committee on Art Education a total of \$1500 and the Carnegie Foundation, a total of \$5000.

5. There was further and extended discussion of the matter of producing a Yearbook on the Social Studies, with special reference to the points of view of Professors Wesley and Wilson on the one hand and of the Board of Directors on the other hand. The view of the Board was once more presented to these joint chairmen who have had this yearbook under consideration for the past three years. [The conclusion of the exchange of opinion, reached shortly after this meeting of the Board, was that Professors Wesley and Wilson decided to abandon the proposed yearbook.]

6. Ways and means of increasing the membership of the Society were discussed.

7. The Board adjourned to meet Saturday morning, February 26, 1938, at Hotel Madison, Atlantic City.

GUY M. WHIPPLE, *Secretary*.

REPORT OF THE TREASURER OF THE SOCIETY FOR 1936-1937

(Sixteen Months from March 1, 1936 to June 30, 1937)

Balance on Hand, February 29, 1936:

Cash	\$ 4,898.13	
Securities	10,398.89	
		<u>\$15,297.02</u>

RECEIPTS

From Sale of Yearbooks by the Publisher	\$17,301.44
From Fees for Quotations	107.02

From Interest and Exchange of Securities:

Interest on Bonds and Deposits	\$ 805.07	
Gain on Bonds Called or Sold	315.76	
		<u>1,120.83</u>

From Dues	3,074.20
From Securities Received (cost value)	1,938.26
From Miscellaneous Items	2.00

From Special Sources:

Carnegie Grant for 'International' Yearbook . . .	\$5,000.00	
Carnegie Grant for 'Art Education'	5,000.00	10,000.00

Total Receipts for the Sixteen Months	33,543.75
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Total Receipts, Including Initial Balance	<u>\$48,840.77</u>
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EXPENSES

Yearbooks

Manufacturing and Distribution:

Reading Yearbook	\$5,310.63	
International Understanding Yearbook	2,296.78	
Reprinting 8 yearbooks (and Insurance)	2,333.60	
Distribution (two yearbooks)	789.05	
		<u>\$10,730.06</u>

Preparation:

International Understanding	\$4,521.74	
Reading	1,194.13	
Social Studies	813.43	
Art Education	729.12	
Maturity	514.62	
Scientific Movement in Education	10.00	
		<u>7,783.04</u>

Total Expended for Yearbooks	<u>\$18,513.10</u>
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Meetings

Society Meeting at New Orleans	\$ 136.75	
Board Meetings at New Orleans and Chicago	688.46	
		<u>\$ 825.21</u>

Editorial, Secretarial, and Clerical Services.....	\$3,663.82	
Supplies, Stationery, Printing, Postage.....	278.14	
Bonding, Auditing, Telegrams, Refunds, etc.....	175.85	
	<u> </u>	\$ 4,117.81

Investments

\$1,000 Empire District Elec. 5s, 1952.....	1,010.00	
Interest on same.....	1.53	
£200 (\$972) Canada Atlantic Railway Co. 4s, 1955.....	928.26	
Interest on same.....	15.12	
	<u> </u>	1,954.91
Total Expenses for the Sixteen Months.....		\$25,411.03
Balance on Hand June 30, 1937.....		<u>23,429.74</u>
Total Expenses and Closing Balance.....		\$48,840.77

COMPOSITION OF BALANCE ON HAND, JUNE 30, 1937

Cash:

Checking Accounts (Two Banks).....	\$4,631.43	
Savings Accounts (Four Banks).....	8,395.40	
	<u> </u>	\$13,026.83

Securities:

Eleven Bonds; Face Value \$10,472; Cost Value.....	10,402.91	
Balance, June 30, 1937.....		<u>\$23,429.74</u>

GUY M. WHIPPLE, *Treasurer*

MEMBERS OF THE NATIONAL SOCIETY FOR THE STUDY OF EDUCATION

(This list includes all persons enrolled Dec. 31, 1937, whether for
1937 or 1938)

HONORARY MEMBERS

Dewey, Emeritus Professor John, Columbia University, New York City.
Hanus, Professor Paul H., Harvard University, Cambridge, Mass.
Holmes, Manfred J., Illinois State Normal University, Normal, Ill.

ACTIVE MEMBERS

Abelson, Dr. Harold H., College of the City of New York, New York City.
Abernethy, Professor Ethel M., Queens College, Charlotte, N. C.
Acharlu, K. S., Head Master, District Normal School, Tumkur, Mysore, India.
Adams, Miss Ruby M., Director of Elementary Education, Schenectady, N. Y.
Adams, Mrs. W. R., University of Vermont, Burlington, Vt.
Aitken, C. C., State School, Kirup, Western Australia.
Alderfer, C. J., 244 Central Ave., Leonia, N. J.
Alexander, Professor Carter, Teachers College, Columbia Univ., New York City.
Alger, John L., President, Rhode Island College of Education, Providence, R. I.
Alleman, S. A., Superintendent of Schools, Napoleonville, La.
Allen, C. F., School Administration Building, Little Rock, Ark.
Allen, Miss Clara B., 145 East Maple Ave., Ottumwa, Iowa.
Allen, I. M., Superintendent of Schools, Highland Park, Mich.
Allin, Miss Josephine T., 4805 Dorchester Ave., Chicago, Ill.
Alter, Harvey E., 100 Ft. Stanwix Park, Rome, N. Y.
Amidon, Paul S., Superintendent of Schools, St. Paul, Minn.
Andersen, Erik A., Deputy Superintendent of Schools, Providence, R. I.
Anderson, Harold A., School of Education, University of Chicago, Chicago, Ill.
Anderson, Homer W., Superintendent of Schools, Omaha, Neb.
Anderson, Professor Howard R., Grad. School of Educ., Cornell Univ., Ithaca, N. Y.
Anderson, Miss Marion, Ginn and Company, Boston, Mass.
Andrews, Miss Elizabeth M., Prin., Bancroft School, Washington, D. C.
Andrews, H. L., Superintendent of Schools, Hoytville, Ohio.
Andrus, Dr. Ruth, State Department of Education, Albany, N. Y.
Ansbaugh, G. E., Principal, Bryant School, Chicago, Ill.
Armstrong, Miss Sara M., State Normal School, Framingham Centre, Mass.
Asgis, Dr. Alfred J., 33 West 42nd St., New York City.
Ashbaugh, Professor E. J., Miami University, Oxford, Ohio.
Atkins, Miss Helen L., Dean of Girls, Manual Training H. S., Denver, Colo.
Atkins, Dr. Ruth E., 217 Normal Avenue, Normal, Ill.
Atkinson, F. H., Henry Ford School, Highland Park, Mich.
Augustin, Miss Eloise D., "The Maples," Otsego Co., Laurens, N. Y.
Avery, F. B., 197 East Post Rd., White Plains, N. Y.
Avery, George T., State Agricultural College, Fort Collins, Colo.

Ayer, Professor Fred C., University of Texas, Austin, Texas.

Ayer, Miss Jean Y., 1 Bank Street, New York City.

Babcock, E. H., Superintendent of Schools, Grand Haven, Mich.

Backus, Professor Joyce, State Teachers College, San Jose, Calif.

Bacon, Francis L., Principal, Evanston Township High School, Evanston, Ill.

Bader, Miss Edith M., Supervisor of Public Schools, Ann Arbor, Mich.

Bagley, Professor William C., Teachers College, Columbia Univ., New York City.

Bailey, Francis L., 99½ College Street, Montpelier, Vermont.

Baker, C. A., Dean of Normal School, Rio Baptist College, Rio de Janeiro, Brazil.

Baker, Miss Edna Dean, Pres., National College of Education, Evanston, Ill.

Baker, Harold V., Prin., Daniel Webster School, New Rochelle, N. Y.

Baker, Dr. Harry J., Director, Psychological Clinic, Public Schools, Detroit, Mich.

Ballou, Frank W., Superintendent of Schools, Washington, D. C.

Balyeat, Professor F. A., University of Oklahoma, Norman, Okla.

Bamberger, Miss Florence E., The Johns Hopkins University, Baltimore, Md.

Bane, Miss Anna W., Roosevelt School, Summit, N. J.

Barber, Elon L., Prin., Benton Hall and Monroe Elem. Schools, Little Falls, N. Y.

Barber, Fred H., Box 247, Emory, Virginia.

Bardy, Joseph, 5321 Wayne Avenue, Apt. 209, Philadelphia, Penn.

Bare, J. M., Principal, Birchwood High School, Birchwood, Tenn.

Barget, Carl W., New Jersey State Teachers College, Jersey City, N. J.

Barnes, Percival Simpson, Superintendent of Schools, East Hartford, Conn.

Barret, Miss Leila May, 321 West Edison Street, Tulsa, Okla.

Barrett, Professor Georgia May, University of Miami, Coral Gables, Fla.

Barrett, Rev. John I., S. E. Cor. Franklin and Cathedral Streets, Baltimore, Md.

Bartlett, Roland O., Prin., Noranda High School, Noranda, Quebec, Canada.

Barton, W. A., Jr., Room 10, Finlay Building, Greenville, S. C.

Bayne, Thomas L., Jr., Graduate School of Education, Cornell Univ., Ithaca, N. Y.

Beall, Ross H., Lee Elementary School, Tulsa, Okla.

Bear, Professor Robert M., Dartmouth College, Hanover, N. H.

Beattie, Alfred W., Superv. Prin., Ben Avon Public School, Pittsburgh, Penn.

Beattie, J. W., Dean, Northwestern University School of Music, Evanston, Ill.

Bedell, Professor R. C., Northeast Missouri State Teachers Coll., Kirksville, Mo.

Bednar, Miss Christine, 633 Blackstone Avenue, Chicago, Ill.

Beeby, Daniel J., 8101 South LaSalle Street, Chicago, Ill.

Behrens, Professor Minnie, Sam Houston State Teachers Coll., Huntsville, Texas.

Bell, Dr. J. Carleton, 1032A Sterling Place, Brooklyn, N. Y.

Bemis, E. O., Jr., Prin., School No. 3, Ecorse, Mich.

Bender, John F., School of Education, University of Oklahoma, Norman, Okla.

Benson, Dr. C. E., New York University, Washington Square, New York City.

Benson, J. R., 6131 Magnolia Avenue, St. Louis, Mo.

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